

حمل الآن

مجاناً وحصرياً

المراجعة رقم (1)

اختبار شهر نوفمبر



1- A) Complete the following sentence:

- Convection occurs in and only.

B) First: Give a reason for:

- 1 Changing the color of iron when it is left in humid (moist) air.
.....

- 2 It is preferable to wear dark colored clothes in winter.
.....

Second: What is meant by ...?

- Specific heat of water is equal to $4180 \text{ J/kg}^\circ\text{C}$.
.....

2- A) Choose the correct answer:

- Sodium hydroxide is also known as

a) limewater b) caustic potash c) caustic soda d) table salt

B) What happens when ...?

- 1 Two bodies with the same temperature come into contact.
.....

- 2 Heating a mixture of oil and sodium hydroxide solution with stirring.
.....

3- A) Put (✓) or (X):

- When heating equal masses of water and oil, water heats up faster because its specific heat is higher. ()

B) Compare between:

- 1 Physical and chemical changes (in terms of their definitions).

Physical change	Chemical change

- 2 Heat transfer by conduction and radiation (in terms of the medium).

Conduction	Radiation

1- A) Choose the correct answer:

- The specific heat of a substance depends on its

a) shape b) type c) mass d) volume

B) First: Classify the following changes into physical or chemical changes:

a- Conversion of milk into yogurt. (.....)

b- Breaking a rock. (.....)

Second: What happens ...?

- When silver chloride precipitate is exposed to sunlight.

.....

2- A) Correct the underlined word:

- Ultraviolet rays are responsible for the feeling of warmth when exposed to sunlight.

(.....)

B) Mention the importance of each of the following:

- 1 Water in the cooling system connected to car engines.

.....

- 2 Thermography.

.....

..

3- A) Write the scientific term:

- It is the state reached by two systems with different temperatures after they come into contact and their temperatures become equal. (.....)

B) Give a reason for:

- 1 It is preferable to use polystyrene panels between hollow bricks when constructing building walls.

.....

.....

- 2 Copper is thermally preferable to aluminum in the manufacture of cooking utensils.

.....

.....

1- A) Put (✓) or (X):

- Boiling water can be considered a chemical change because it produces steam. ()

B) First: Give a reason for ...?

- 1 A protective mask is used when carrying out some chemical reactions.

.....

- 2 Mercury is used in the manufacture of thermometers.

.....

Second: Mention the importance of:

- Hollow clay bricks.

.....

2- A) Write the scientific term:

- The transfer of thermal energy in fluids with the movement of their particles.

(.....)

B) Answer the following questions:

- 1 Mention the factors affecting the change in the temperature of a system.

.....

.....

- 2 Compare between methods of heat transfer "in terms of heat flow direction".

Conduction	Convection	Radiation

3- A) Complete the following sentence:

- A camera can detect the radiation emitted by objects and converts it into colored images.

B) What happens when:

- 1 Silver nitrate solution is added to sodium chloride.

.....

.....

- 2 Fireworks ignition.

.....

.....

1- A) Complete the following sentence:

- When two bodies with different temperatures come into contact, heat flows from the to the body.

B) First: What happens when:

- 1 Heating sugar until it burns.

.....

- 2 Snakes have lost their sensory receptors in their heads.

.....

Second: Mention the products of the following reaction:

- A chemical reaction occurs when methane gas (CH_4) burns in the presence of oxygen.

.....

2- A) Write the scientific term:

- Breaking bonds between atoms of reactants and forming new bonds between product atoms. (.....)

B) Classify the following changes as physical or chemical:

- 1 Limewater turns milky when CO_2 is passed through it. (.....)
- 2 Iodine sublimation. (.....)

3- A) Choose the correct answer:

- The phenomenon of occurs due to difference between the specific heat of land and sea.

a) tides b) lunar eclipse c) sea breeze d) solar eclipse

B) Give a reason for:

- 1 The presence of cooling systems inside electronic devices made of thermal conductors.

.....

- 2 The blue color of a copper sulfate solution disappears when a zinc plate is placed in it.

.....

1- A) Put (✓) or (X):

- The specific heat of beach sand is equal to the specific heat of water. ()

B) Give a reason for:

- 1 Firefighters wear shiny silver suits.

.....

- 2 The cut surface of an apple turns brown when it is exposed to air.

.....

- 3 Cooking pans are made of aluminum.

.....

2- A) Choose the correct answer:

- Heater transfer heat by

a) conduction only

b) convection only

c) convection and conduction

d) convection and radiation

B) What indicates that the following reactions have occurred....?

- 1 Orange goes rotten.

.....

- 2 Reaction of magnesium with dilute hydrochloric acid.

.....

3- A) Complete the following sentence:

- Evidence of a chemical reaction includes the emission of, such as what happens when a strip of burns.

(B) Answer the following questions:

- 1 Give an example of a thermal conductor used in electronic devices

.....

- 2 Compare between thermal conductors and insulators:

Thermal conductors	Thermal insulators

1- A) Complete the following sentence:

- Convection occurs in **liquids** and **gases** only.

B) First: Give a reason for:

- 1 Changing the color of iron when it is left in humid (moist) air.
 - Due to a chemical reaction between the iron and the oxygen in the humid air, a new substance with different properties is produced.
- 2 It is preferable to wear dark colored clothes in winter.
 - Because they absorb infrared radiation, making us feel warm.

Second: What is meant by ...?

- Specific heat of water is equal to 4180 J/kg°C.
 - The amount of heat required to raise the temperature of 1 kilogram of water by $^{\circ}\text{C} = 4180 \text{ J}$.

2- A) Choose the correct answer:

- Sodium hydroxide is also known as
 - a) limewater
 - b) caustic potash
 - c) **caustic soda**
 - d) table salt

B) What happens when ...?

- 1 Two bodies with the same temperature come into contact.
 - Thermal energy doesn't flow between them.
- 2 Heating a mixture of oil and sodium hydroxide solution with stirring.
 - A solid substance (soap) forms with different properties as a result of a chemical reaction.

3- A) Put (✓) or (X):

- When heating equal masses of water and oil, water heats up faster because its specific heat is higher. (X)

B) Compare between:

- 1 Physical and chemical changes (in terms of their definitions).

Physical change	Chemical change
A change in state or shape of a substance without changing its chemical composition.	A change that results in new substances with chemical properties different from those of the original substances.

- 2 Heat transfer by conduction and radiation (in terms of the medium).

Conduction	Radiation
It occurs in solids such as metals.	It occurs in vacuums and gases.

1- A) Choose the correct answer:

- The specific heat of a substance depends on its

a) shape b) type c) mass d) volume

B) First: Classify the following changes into physical or chemical changes:

a- Conversion of milk into yogurt.

Chemical change

b- Breaking a rock.

Physical change

Second: What happens ...?

- When silver chloride precipitate is exposed to sunlight.

- Its color changes from white to violet.

2- A) Correct the underlined word:

- Ultraviolet rays are responsible for the feeling of warmth when exposed to sunlight.

(Infrared rays)

B) Mention the importance of each of the following:

- 1 Water in the cooling system connected to car engines.

- Cooling car engines and protecting them from damage.

- 2 Thermography.

- It is used for detecting the thermal radiation emitted from objects and convert it into colored images.

3- A) Write the scientific term:

- It is the state reached by two systems with different temperatures after they come into contact and their temperatures become equal. (Thermal equilibrium)

B) Give a reason for:

- 1 It is preferable to use polystyrene panels between hollow bricks when constructing building walls.

- To avoid rapid changes in temperature inside buildings when temperatures change outside buildings, which reduces the cost of air conditioning inside buildings.

- 2 Copper is thermally preferable to aluminum in the manufacture of cooking utensils.

- Because copper is a better conductor of heat than aluminum.

1- A) Put (✓) or (X):

- Boiling water can be considered a chemical change because it produces steam. (X)

B) First: Give a reason for ...?

- A protective mask is used when carrying out some chemical reactions.
 - To avoid harmful effects of bright light.
- Mercury is used in the manufacture of thermometers.
 - Because of its low specific heat compared to other liquids, and it is sensitive and responds quickly to temperature changes in thermometers.

Second: Mention the importance of:

- Hollow clay bricks.
 - They are used in the construction of the exterior walls as the thermal conductivity of the air found in the hollow cavities of bricks is low.

2- A) Write the scientific term:

- The transfer of thermal energy in fluids with the movement of their particles. (Thermal convection)

B) Answer the following questions:

- Mention the factors affecting the change in the temperature of a system.
 - The mass of the substance
 - The type of the substance
 - The state of the substance
- Compare between methods of heat transfer "in terms of heat flow direction".

Conduction	Convection	Radiation
Heat transfers from the hot object to the cold object.	Heat transfers upward "from the area of least density in the fluid to the area of the greatest density".	Heat transfers in all directions.

3- A) Complete the following sentence:

- A **thermograph** camera can detect the **infrared** radiation emitted by objects and converts it into colored images.

B) What happens when:

- Silver nitrate solution is added to sodium chloride.
 - A chemical reaction occurs, forming a white precipitate of silver chloride, which is insoluble in water.
- Fireworks ignition.
 - Light and heat are emitted as a result of the chemical reaction.

1- A) Complete the following sentence:

- When two bodies with different temperatures come into contact, heat flows from the **higher temperature** to the **lower temperature** body.

B) First: What happens when:

- 1 Heating sugar until it burns.
 - A black substance with strong odor will produce.
- 2 Snakes have lost their sensory receptors in their heads.
 - They cannot detect infrared radiation emitted by their prey and cannot hunt at night.

Second: Mention the products of the following reaction:

- A chemical reaction occurs when methane gas (CH_4) burns in the presence of oxygen.
 - Carbon dioxide gas and water vapor.

2- A) Write the scientific term:

- Breaking bonds between atoms of reactants and forming new bonds between product atoms. (Chemical reaction)

B) Classify the following changes as physical or chemical:

- 1 Limewater turns milky when CO_2 is passed through it. Chemical change
- 2 Iodine sublimation. Physical change

3- A) Choose the correct answer:

- The phenomenon of occurs due to difference between the specific heat of land and sea.
a) tides b) lunar eclipse c) sea breeze d) solar eclipse

B) Give a reason for:

- 1 The presence of cooling systems inside electronic devices made of thermal conductors.
 - To dissipate the heat generated in the internal components, which may lead to poor performance or damage.
- 2 The blue color of a copper sulfate solution disappears when a zinc plate is placed in it.
 - This is due to the occurrence of a chemical reaction, which forms the colorless zinc sulfate solution.

1- A) Put (✓) or (X):

- The specific heat of beach sand is equal to the specific heat of water. (✓)

B) Give a reason for:

- 1 Firefighters wear shiny silver suits.
 - Because they reflect most amount of heat and thermal radiation resulting from fires.
- 2 The cut surface of an apple turns brown when it is exposed to air.
 - Due to a chemical reaction with oxygen in humid (moist) air.
- 3 Cooking pans are made of aluminum.
 - Because aluminum is a thermal conductor.

2- A) Choose the correct answer:

- Heater transfer heat by
 - a) conduction only
 - b) convection only
 - c) convection and conduction
 - d) convection and radiation

B) What indicates that the following reactions have occurred....?

- 1 Orange goes rotten.
 - The change of the color of the orange and the emission of a bad odor.
- 2 Reaction of magnesium with dilute hydrochloric acid.
 - Formation of hydrogen gas bubbles.

3- A) Complete the following sentence:

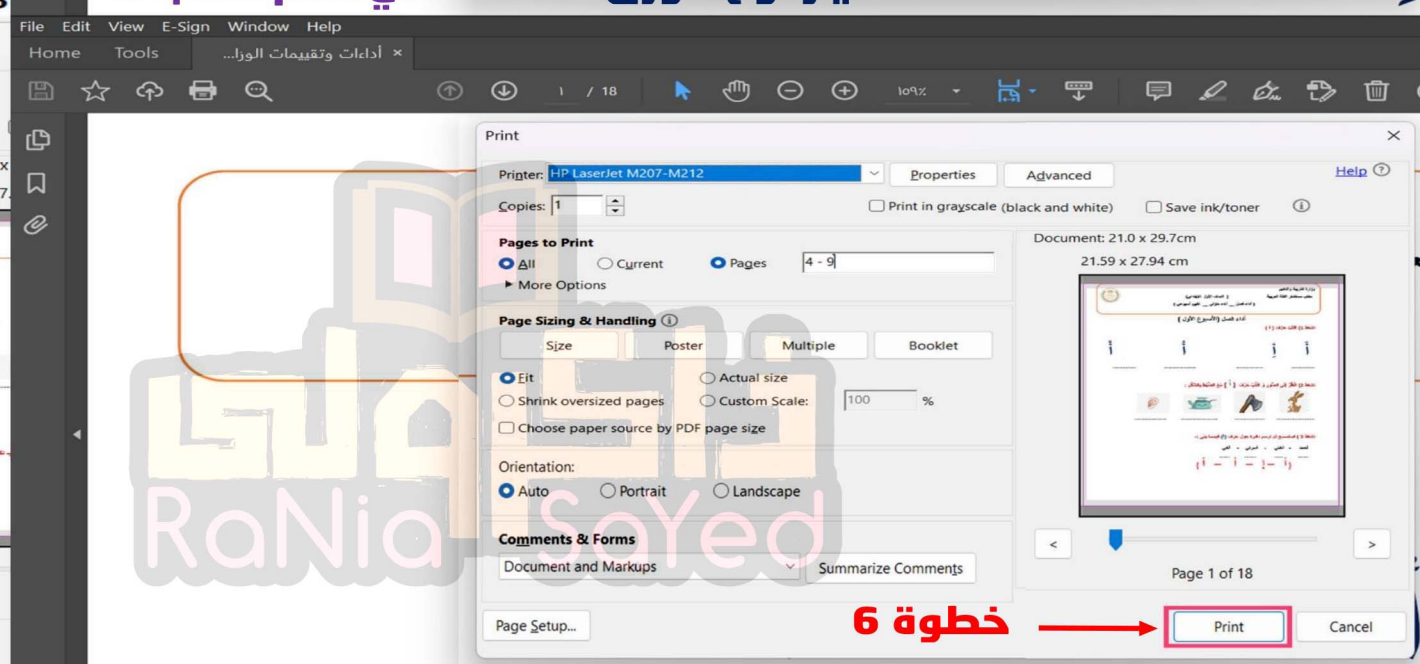
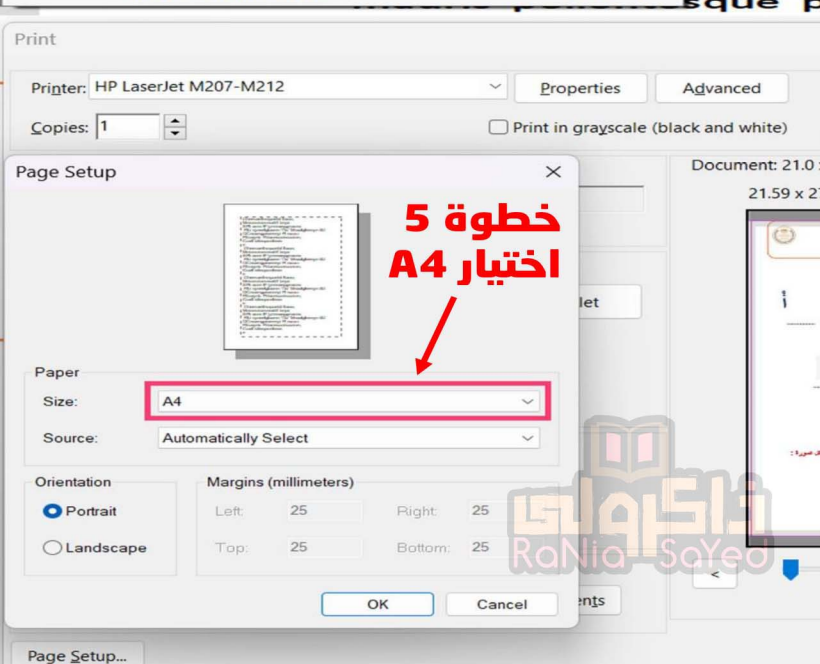
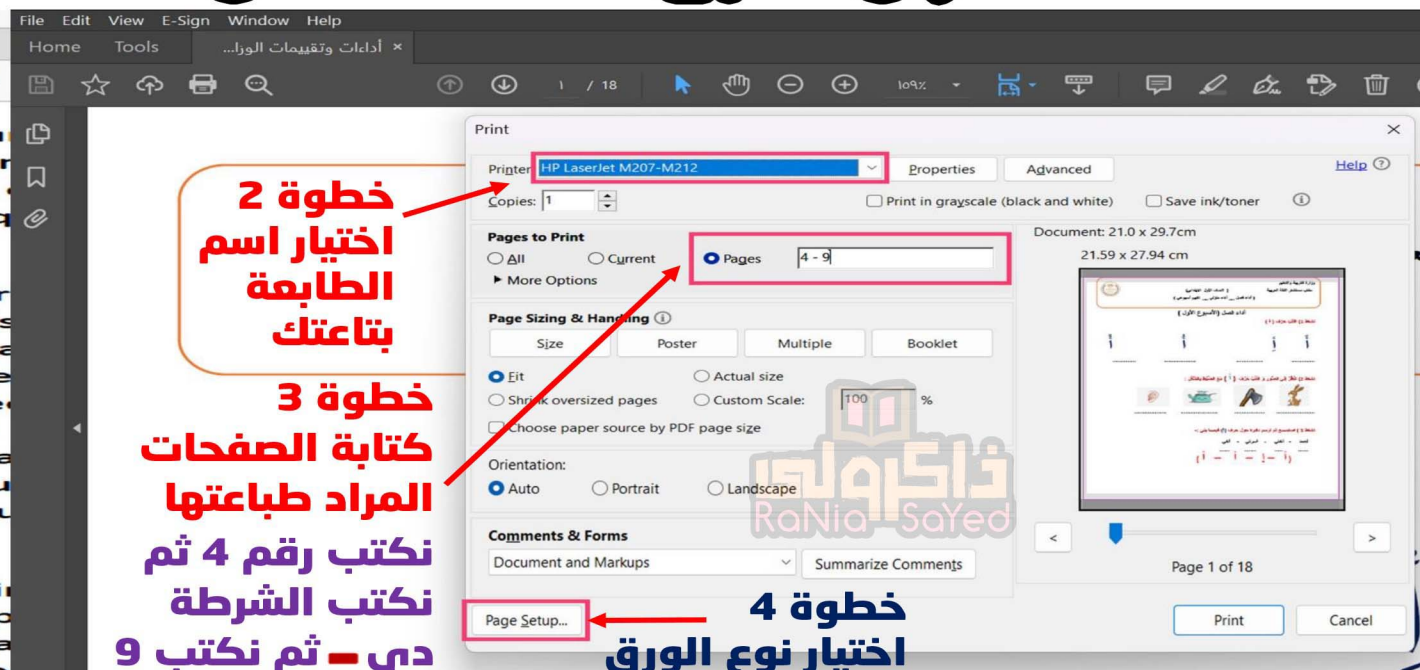
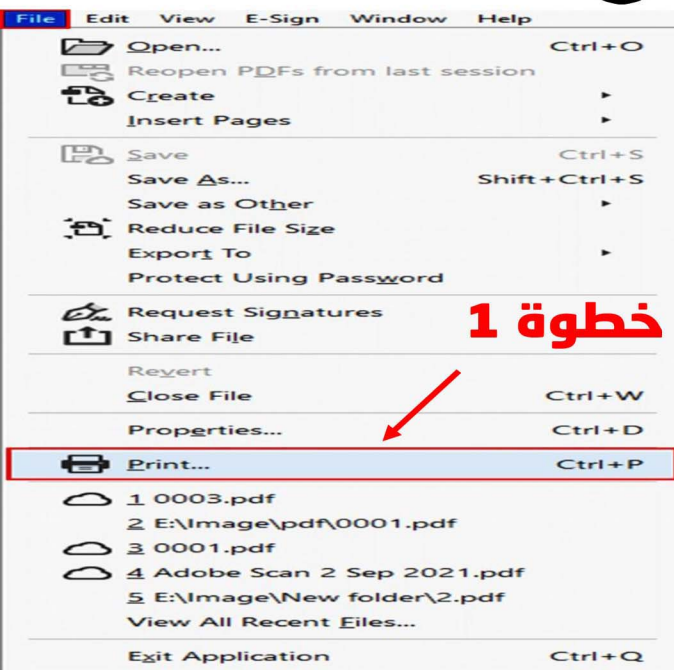
- Evidence of a chemical reaction includes the emission of **light and heat**, such as what happens when a strip of **magnesium** burns.

(B) Answer the following questions:

- 1 Give an example of a thermal conductor used in electronic devices
 - Silver.
- 2 Compare between thermal conductors and insulators:

Thermal conductors	Thermal insulators
They are good conductors of heat.	They are poor heating conductors.
Examples: Diamond and metals.	Examples: Wood and plastic.

كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9



حمل الآن

مجاناً وحصرياً

المراجعة رقم (2)

اختبار شهر نوفمبر



What is meant by ?

Heat	The energy that is transferred from one system to another or to the surroundings due to a difference in their temperatures.
Thermal equilibrium	The state reached by two systems with different temperatures after they come into contact and their temperatures become equal.
Thermal conduction	The transfer of thermal energy through solid objects from one point to another without the particles moving from their positions.
Thermal conductivity	The measure for the extent to which a substance can conduct heat through it.
Thermal conductors	They are good heat-conducting substances (their thermal conductivity is high).
Thermal insulators	They are poor heat-conducting substances (their thermal conductivity is low).
Thermal convection	The transfer of thermal energy in fluids with the movement of their particles.
Sea breeze	Cool air (breeze) blowing from the sea towards the land during the daytime.
Electromagnetic waves	Waves that propagate (travel) through space at very high speeds reaching 300,000 km/s in all directions.
Thermal radiation	The transfer of infrared radiation from the surfaces of objects, especially hot objects, without the need for material particles.
Thermography	A technique that uses a camera to detect the thermal radiation (infrared rays) emitted from objects and convert it into coloured images, the colours in these images depend on changes in the object's temperature.

Give reason ?**1 The difference between the concept of heat and the concept of temperature.**

Because heat is energy that transfers from one system to another due to a difference in their temperatures, while temperature indicates the degree of hotness or coldness of an object and is considered as the measure of the average kinetic energy of its particles.

2 Cooking pans are made of aluminum with wooden handles.

Because aluminum is a thermal conductor, while wood is a thermal insulator.

3 Polystyrene panels are placed between bricks during building walls.

Because polystyrene is a thermal insulator substance that helps to avoid rapid temperature changes inside buildings when temperatures change outside, that leads to reducing air conditioning costs within the buildings.

4 It is preferred to use hollow clay bricks rather than solid clay bricks during constructing wall.

Because the thermal conductivity of the air present in the hollow spaces of hollow bricks is approximately 20 times less than that of the clay brick substance.

5 The use of silver in cooling systems within smartphones.

To get rid of the heat generated within the internal components, which may lead to reduce performance and may damage them.

6 The eagle can fly in the air at great heights without flapping its wings, despite the Earth's gravitational force pulls it down.

Because the warm air convection currents rising from the Earth's surface cause it to rise upwards, which is equal to the gravitational force and keeps the eagle floating in the air.

7 Heat does not transfer by convection through solid substances.

Because convection currents transfer through the movement of particles in a substance, and the particles in solid substances do not move from their position.

8 It is preferred to place the electric space heater on the floor of the room.

To ensure the distribution of heat throughout the room where heat is transferred from the space heater to the surrounding air, causing the warmer, less dense air to rise to the top while the cooler, denser air moves downwards (to sink).

9 The occurrence of the sea breeze phenomenon.

Due to the fact that land heats up more quickly than water during the day, this is due to the lower specific heat of land compared to that of sea water.

10 The sand on the beach is hotter than the sea water at noon.

Because the specific heat of the sand is lower than that of water.

11 The heat of the Sun transfers to us through radiation.

Because heat transfer by radiation does not require the presence of material particles.

- 12 It is preferred to wear dark coloured clothes in winter and light coloured clothes in summer.**

Because dark coloured clothes absorbs infrared radiation better than light coloured clothes.

- 13 Painting solar heater pipes in black colour.**

To increase its absorption of infrared radiation so the temperature of the water within it rises.

- 14 Firefighters wear shiny silver clothes.**

Because shiny objects reflect infrared rays well.

- 15 Snakes are able to hunt their preys at night.**

Because they receive infrared rays emitted from the bodies of preys through sensory receptors located at the front of their head.

What happens when ?

- 1 A hot metal block is dipped in a beaker of cold water (according to the temperature of both the metal mass and the water).**

The temperature of the metal block decreases while the temperature of the water increases until they reach thermal equilibrium.

- 2 Two non-isolated systems with different temperatures come into contact.**

Heat transfers from the system at a higher temperature to the system at a lower temperature until they reach thermal equilibrium.

- 3 A hot drink at a temperature of 70°C is mixed with another drink at a temperature of 20°C**

The temperature of the hot drink decreases while the temperature of the cold drink increases, until their temperatures are equal when thermal equilibrium is reached.

- 4 A metal spoon is placed in a cup of hot tea.**

Heat transfers from the hot tea to the spoon by conduction.

- 5 Heating the end of a metal rod with small pins that are fixed on it with small pieces of wax.**

The pins fall one by one from the closest end to the heating source to the furthest end.

- 6 Polystyrene insulating panels are used between the building walls during construction.**

Thermal insulation increases, preventing the feeling of rapid temperature changes outside the building and reducing the cost of air conditioning inside the building.

Compare between ?

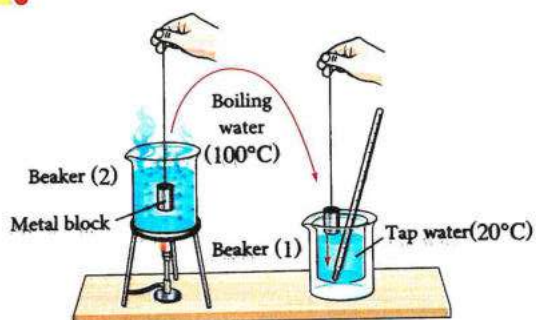
1 Thermal conduction	Thermal convection	Thermal radiation
The transfer of thermal energy through solid objects from one point to another, without the particles moving from their positions	The transfer of thermal energy through fluids with the movement of their particles	The transfer of thermal energy from the surfaces of hot objects without the need for material particles
Heat transfers from the objects (point) with the highest temperature to the objects (point) with the lowest temperature, till thermal equilibrium occurs	Heat transfers upwards (from the region of least density in the fluid to the region of greatest density)	Heat transfers in all directions
It takes place as a result of the contact between particles of solids	It takes place as a result of the movement of fluid particles	It takes place without the need for a material medium
It occurs in solid matter only	It occurs in liquid and gaseous matter (fluids)	It occurs in both vacuum (space) and gases

2 Thermal conductors	Thermal insulators
They are good heat-conducting substances (high thermal conductivity). Example : • Diamond. • Metals in general, such as: aluminum and copper.	They are poor heat-conducting substances (low thermal conductivity) Example : • Wood. • Plastic.

Study the following figures, then answer ?

In the experiment shown in the opposite figure, if the temperature of the piece of metal before it was placed in the boiling water is 30°C , answer the following:

- (1) In which direction does heat flow in the beaker (2)?
- (2) What happens to the temperature of the water in the beaker (1) after the metal block is transferred from the boiling water to it? Explain your answer.

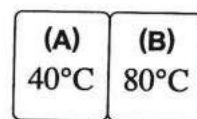


Answer

- (1) Heat transfers from the boiling water to the metal block.
- (2) The temperature of the tap water rises above 20°C due to the transfer of heat from the metal block.

From the two opposite figures, mention :

- (1) Possible methods of heat transfer in each of them.
- (2) The direction of heat transfer in Figure (1).



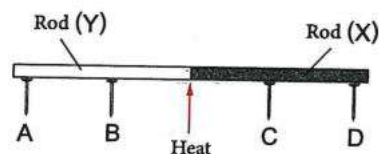
(1)

(2)

Answer

- (1) * **Figure (1)** : Heat transfer by conduction.
* **Figure (2)** : Heat transfer by convection and radiation.
- (2) Heat transfers from object (B) to object (A).

The opposite figure shows a practical experiment in which four pins were fixed with identical wax pieces on rods (X) and (Y), which are of the same length and thickness :



- (1) What is the purpose of making this experiment?
- (2) What is the scientific explanation for the falling of the pin (C) :
 - 1- Before the pin (B).
 - 2- Before the pin (D).

Answer

- (1) To show the difference in thermal conductivity of different substance.
- (2) 1- Because the thermal conductivity of rod (X) is greater than the thermal conductivity of rod (Y).
2- Because point (C) is closer to the heat source than point (D).

From the opposite figure:

What is the method of heat transfer in each of (1), (2), (3)?

Answer

- (1) : Conduction.
- (2) : Convection.
- (3) : Radiation.



Variant Questions ?

Q1 When does the heat transfer stop between two objects in contact, one at a temperature of 100°C and the other at 60°C ?

A When their temperatures are equal and they reach thermal equilibrium.

Q2 Mention the methods by which heat transfers.

A Conduction, convection, and radiation.

Q3 Explain how heat transfers from one end of a copper rod to the other end when it is heated.

A Heat transfers as a result of collisions between particles, allowing energy to move from the point of higher temperature to the point of lower temperature along the rod, without the particles themselves moving from their positions.

Q4 Arrange the following natural elements according to their thermal conductivity:

(Copper - Diamond - Silver)

A Diamonds, then silver, then copper.

Q5 Mention one life application about heat transfer by:

(1) Conduction. (2) Convection. (3) Radiation.

A

- (1) The manufacture of cooking utensils from metals and the production of their handles from plastic or wood.
- (2) The occurrence of the sea breeze phenomenon in summer due to convection currents.
- (3) Firefighters wear shiny silver clothes.

What is meant by ?

Physical change	A change in the state or shape of a substance without changing its chemical composition.
Chemical change	A change that results in new substances with chemical properties different from those of the original substances.
Chemical reaction	The process of breaking the bonds between atoms of the reacting substances (reactants) and forming new bonds between atoms of the produced substances (products).

Give reason ?

- Ice melting is a physical change.**
Because it is not accompanied by a change in chemical composition.
- Breaking of a bottle filled to the brim with water and tightly closed when placed in the freezer, is not a chemical reaction.**
Because the expansion of water during freezing does not lead to a change in the chemical composition of water or glass.
- Effervescence occurs when sodium bicarbonate is added to acetic acid.**
Due to the occurrence of a chemical reaction, accompanied by the evolution of carbon dioxide gas.
- Formation of a white precipitate when silver nitrate solution is added to sodium chloride solution.**
Due to the occurrence of a chemical reaction that results in the formation of silver chloride, which does not dissolve in water.
- The formation of gas bubbles when dilute hydrochloric acid is added to a strip of magnesium.**
Due to the occurrence of a chemical reaction, resulting in the evolution of hydrogen gas.
- During burning a strip of magnesium, a protective mask must be used.**
To avoid the damage from the bright light.
- A strong odour is emitted when sugar is burned.**
Due to the occurrence of a chemical reaction that results in the formation of caramel.
- Iron goes rusty when it is exposed to oxygen in moist air.**
Due to the occurrence of a chemical reaction between iron and moist atmospheric oxygen.

What do you observe when ?

- 1 **Baking soda (sodium bicarbonate) is added to vinegar (dilute acetic acid).**

Effervescence occurs with evolution of gas bubbles of carbon dioxide gas.

- 2 **Silver nitrate solution is added to sodium chloride solution.**

A white precipitate of silver chloride is formed, which turns violet when exposed to sunlight.

- 3 **A piece of zinc is added to the copper sulphate solution.**

The blue colour of the copper sulphate solution disappears, and reddish-brown copper is deposited over the zinc plate.

- 4 **Sugar is burnt.**

A solid black substance (carbon) is formed, with smoke and a strong odour.

- 5 **A liquid mixture of oil and caustic soda solution is heated with continuous stirring.**

The liquid consistency changes, and solid soap is formed.

- 6 **An iron nail is exposed to moist air.**

The nail rusts due to its reaction with moist atmospheric oxygen.

- 7 **Slices of apples are left in the air.**

The colour of apple slices turn brown.

Remember that

The following table illustrates examples of the two types of changes that occur in substance :

Substance changes	Examples
Physical changes	• Dissolution of salt in water. • Melting of ice. • Wood cutting. • Water evaporation.
Chemical changes	• Conversion of milk into yogurt. • Rusting of an iron nail. • Burning a piece of bread in the oven. • Limewater turns milky (turbid) when carbon dioxide gas passes through it. • The colour of a damp (wet with water) universal indicator strip is changed when it is brought close to ammonia gas. • Frying eggs. • Food spoiling outside the refrigerator. • Ignition of fireworks.

How can you deduce the occurrence of the chemical reaction be indicated when ?

1 Baking soda is added to sulphuric acid.

The occurrence of effervescence with evolution of gas bubbles of carbon dioxide gas.

2 Silver nitrate solution is added to sodium chloride solution.

Formation of a white precipitate of silver chloride, which turns violet when exposed to sunlight.

3 Zinc plate is placed in a copper sulphate solution.

The blue colour of the copper sulphate solution disappears, and reddish-brown copper is deposited over the zinc plate.

4 Dilute hydrochloric acid is added to a strip of magnesium.

Formation of gas bubbles of hydrogen gas.

5 A strip of magnesium is heated in the air.

The strip glows with a bright light accompanied by heat emission, and converts into a white powder.

6 Sugar is burned.

It turns black with the evolution of smoke and a strong odour (caramel smell).

7 Oil reacts with caustic soda.

The liquid mixture turns into solid soap.

8 Eggs are fried.

The colour and texture of the white part (egg whites) and yellow part (egg yolk) of eggs change.

9 Iron is exposed to moist atmospheric oxygen.

The iron rusts and changes its colour.

10 An apple is cut into slices and left it in the air.

Its colour turns to brown.

11 Fireworks are lit.

Emission of light and heat.

Variant Questions ?

Q1 When a zinc plate is placed in blue copper sulphate solution, and observed that the colour of the solution was disappeared and a precipitate is formed :

- (1) What is the name of the formed precipitate?
- (2) How to explain the disappearance of the colour of the solution?

A (1) Copper.

(2) Due to the formation of the colourless zinc sulphate solution.

Q2 Apply the concept of chemical reaction to the reaction between nitrogen gas N_2 and hydrogen gas H_2 to form ammonia gas NH_3

A The breaking of bonds between the atoms of the molecules of each of N_2 , H_2 (the reactants) and the formation of new bonds between the atoms of the molecules of NH_3 (the product).

Q3 Mention some indications of the occurrence of the chemical reaction "only four are required".

- | | | | |
|------------|-----------------------------|---|--|
| A * | Formation of precipitate. | * | Change in the colour of the substance. |
| * | Emission of odour. | * | Evolution of gas. |
| * | Emission of light and heat. | * | Change in consistency. |

Q4 Solution (A) was added to sodium chloride solution, so a white precipitate is formed:

- (1) What is solution (A) ?
- (2) What is the change in the colour of the precipitate when exposed to sunlight?

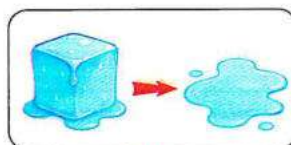
A (1) Silver nitrate solution.

(2) The colour of the precipitate turns violet.

Study the following figures, then answer ?

 From the two opposite figures:

- (1) Which of them represents a chemical change? Giving reasons.
- (2) In which of them there is no change in the chemical composition of the substance?



(1)



(2)

Answer

(1) Figure (2) due to the formation of new substance which differs in their properties from the properties of wood.

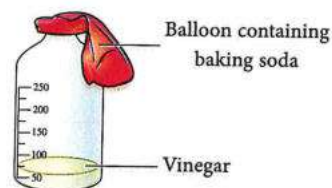
(2) The state expressed in figure (1).

From the opposite figure:

(1) What do you observe when you lift the balloon to pour baking soda into the bottle?

(2) What do you conclude from this activity?

(3) What is the scientific name of each of the two reactants?



Answer

(1) The evolution of gas bubbles and evolving gas causes the balloon to inflate.

(2) A chemical reaction occurs between baking soda and vinegar.

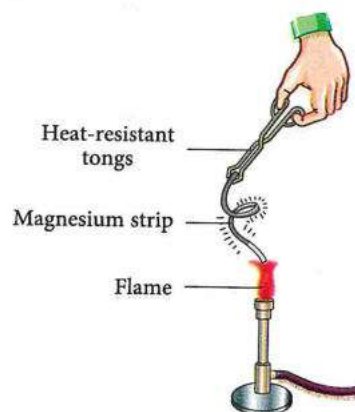
(3) **Baking soda:** sodium bicarbonate, **vinegar:** dilute acetic acid.

From the opposite figure:

(1) What do you observe? with explanation.

(2) What is the importance of the heat-resistant tongs in the figure?

(3) Identify another safety precaution that should be considered after the end of the reaction, with an explanation of the reason.



Answer

(1) The magnesium strip glows with a bright light accompanied by heat emission, due to a chemical reaction.

(2) To avoid burns during its combustion.

(3) Do not touch the formed white powder immediately after the reaction, as it will be very hot.

حمل الآن

مجاناً وحصرياً

المراجعة رقم (3)

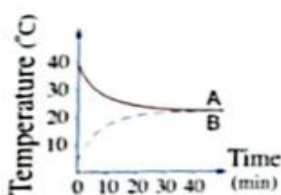
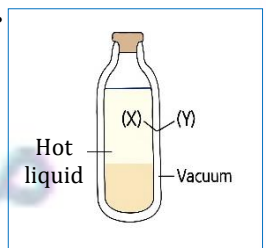
اختبار شهر نوفمبر



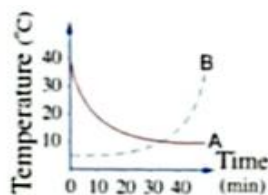
1

Choose the correct answer:

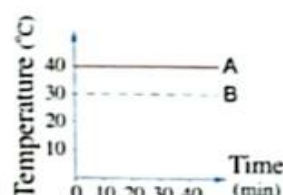
- 1- When a tray of pies is removed from the oven and placed on a metal surface,
- (A) the pie absorbs heat from the tray.
 (B) the heat is transferred from the tray to the surrounding air only.
 (C) heat is transferred from the pie to the air and the tray.
 (D) heat is transferred from the tray to the air and the metal surface.
- 2- A lemon drink its temperature is 20°C was placed with a cube of ice, and after two minutes, the temperature of the drink became 8°C , the temperature of the remaining part of the ice cube was
- (A) 0°C (B) 2°C (C) 4°C (D) 8°C
- 3- What happens to the cold air outside a kettle when it comes into contact with its hot outer surface?
- (A) Its density decreases and it sinks downwards.
 (B) Its density decreases and rises upwards.
 (C) Its density increases and it sinks downwards.
 (D) Its density increases and it rises upwards.
- 4- The opposite figure shows a thermos flask with two walls (X) and (Y), containing a hot liquid. Which of the following is correct?
- (A) Heat is transferred from (X) to (Y) by conduction and convection.
 (B) Heat is transferred from (Y) to (X) by conduction only.
 (C) Heat is transferred from (X) to (Y) by radiation only.
 (D) Heat is transferred from (Y) to (X) by radiation and convection.
- 5- (A), (B) are two equal quantities of water, temperature of (A) is 40°C and that of (B) is 5°C . Which of the following graphs shows the change in temperature when they are mixed together?



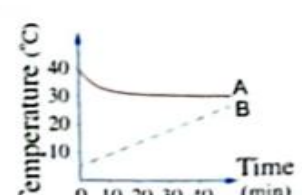
(a)



(b)



(c)



(d)

Lesson 1

6- Which of the following expresses a chemical change?

- (A) Iodine sublimation. (B) The conversion of charcoal to ash.
(C) The heating of an iron rod. (D) The melting of ice.

7- The combustion (burning) of table sugar is indicated by the formation of

- (A) a solid matter and evolution of smoke.
(B) a white precipitate and evolution of smoke.
(C) green solution and reddish brown gas.
(D) white powder and bright light.

8- The following reactions were carried out:

- (1) Burning a strip of magnesium.
(2) Adding hydrochloric acid to magnesium.
(3) Adding sulphuric acid to baking soda.

Which of these reactions is accompanied by the release of gas?

- (A) (1) Only. (B) (2) Only. (C) (1) , (3). (D) (2) , (3).

9- Soap is formed by the reaction of

- (A) a oil with solid sodium hydroxide. (B) oil with sodium hydroxide solution.
(C) Coil with hydrochloric acid. (D) oil with silver nitrate solution.

10- All chemical reactions are accompanied by the following, except

- (A) breaking down the bonds between the molecules of the reactants.
(B) forming bonds between the molecules of the products.
(C) the formation of new substances.
(D) the release of heat.

Lesson 2

11- In the balanced equation: $PCl_5 + 4H_2O \rightarrow H_3PO_4 + 5HCl$

What is the total number of coefficients of reactants molecules and the total number of subscripts of the products respectively?

- (A) 5,7 (B) 5,10 (C) 9,5 (D) 6,5

12- Which of the following expresses the physical state of the substances of the reaction between magnesium metal and hydrochloric acid to form magnesium chloride solution and hydrogen gas?

- (A) $\text{Mg}_{(g)} + \text{HCl}_{(\ell)} \rightarrow \text{MgCl}_{(\text{aq})} + \text{H}_{2(g)}$
 (B) $\text{Mg}_{(g)} + \text{HCl}_{(\text{aq})} \rightarrow \text{MgCl}_{2(\ell)} + \text{H}_{2(g)}$
 (C) $\text{Mg}_{(s)} + \text{HCl}_{(\ell)} \rightarrow \text{MgCl}_{2(\ell)} + \text{H}_{2(\ell)}$
 (D) $\text{Mg}_{(s)} + \text{HCl}_{(\text{aq})} \rightarrow \text{MgCl}_{2(\text{aq})} + \text{H}_{2(g)}$

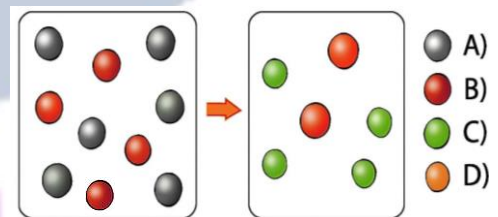
13- Which of the following verifies the law of conservation of mass when magnesium reacts with oxygen to form magnesium oxide?

Choices	MgO	O ₂	Mg
(A)	15.36 g	3.2 g	4.8 g
(B)	1.6 g	4.8 g	3.28
(C)	8g	3.2 g	4.8 g
(D)	7.4 g	4.8 g	3.2 g

14- The following figure illustrates a chemical reaction:

What is the balanced symbolic equation which represents this reaction?

- (A) $6A + 4B \rightarrow 4C + 2D$
 (B) $6A + 4B \rightarrow C + D$
 (C) $A + 2B \rightarrow 2C + D$
 (D) $3A + 2B \rightarrow C2 + D$



2 Answer the following:

Lesson 4

1- What are the factors that affect the temperature of a body (system) ?

.....

2- Explain how the properties of a material affect the rate of heat transfer by conduction?

.....

3- Why does heat not transfer in a vacuum by conduction or convection?

4- How does the method of heat transfer differ in metals from that in air?

5- Explain why:

- Firefighters wear shiny silver suits.

- Polystyrene boards are used between hollow bricks when constructing building walls.

6- What do you observe when ?

Lesson 1,2

a- Burning table sugar.

b- Heating a mixture of caustic soda and oil with continuous stirring.

c- Slices of apple or potato are left exposed to the open air.

7- How do you infer that a chemical reaction has occurred in the following experiments

a- Frying an egg.

b- Igniting fireworks.

c- Adding a piece of a magnesium strip to a test tube containing dilute hydrochloric acid.

8- How do we infer the occurrence of a chemical reaction?

9- What are the steps of a chemical reaction?

10- What are the laboratory safety precautions when burning a magnesium ribbon?

11- Mention examples of some chemical reactions that occur in daily life.

3

Complete the following sentences:

Lesson 4

- 1- Heat transfers in three different ways: , and
- 2- Energy transfers from a system with a temperature to a system with a temperature.
- 3- The sun's heat reaches us by , while a heater's heat reaches us by and
- 4- A camera can sense the radiation emitted by objects and convert it into color images
- 5- Heat is transferred from one point to another in objects by
- 6- Thermal conductors include while thermal insulators include
- 7- Cooking pot handles are made of or , while the pots themselves are made of
- 8- Silver is preceded by and followed by in thermal conductivity.
- 9- panels are placed between bricks to prevent changes in temperatures inside the buildings.
- 10- Heat is transferred by conduction as a result of among the particles of matter in contact with each other, while it is transferred by convection as a result of of the fluid particles.
- 11- Heat transfers in iron by , while it transfers in water by
- 12- The density of hot water is , while the density of cold water is

- 13- Sea breeze occurs as a result of the movement of hot air of the which replaced by cold air of the
- 14- The phenomenon of sea breeze is based on heat transfer by, while the cooling systems of electronic devices depend on heat transfer by
- 15- Heat transfers in gases by and
- 16- Dissolving sugar in water is a change, while burning the sugar is a change.
- 17- Chemical reaction includes the change of into
- 18- One of the indications of chemical reactions is the formation of that does not dissolve in water and emission of light or
- 19- The scientific name of baking soda is, while the scientific name of vinegar is
- 20- The reaction of baking soda with vinegar is indicated by the formation of of gas.
- 21- When silver chloride precipitate is exposed to sunlight, it turns from to colour colour
- 22- The colour of copper sulphate solution is, while zinc sulphate solution is
- 23- When zinc is added to copper sulphate solution, solution is formed and is deposited.
- 24- The combustion of a magnesium strip in the air is accompanied by the emission of and
- 25- Silver chloride in water, while magnesium oxide in water.
- 26- The colour of sugar before burning is while its colour after burning is
- 27- When the mixture of oil and sodium hydroxide solution is heated, it is converted from state to state.
- 28- Soap is formed due to the reaction of with
- 29- When eggs are fried, the colour and texture of each of and change, this indicates the occurrence of the chemical reaction.

Lesson 1

Lesson 2

- 30- In the chemical symbolic equation, the symbol indicates that the substance is in its liquid state, while the symbol indicates that the substance is present in the form of an aqueous solution.
- 31- In the equation of heating copper carbonate to obtain carbon dioxide, the symbol written on the reaction arrow and the symbol written below to the right of the formula CO_2
- 32- The occurrence of effervescence during the chemical reaction indicates the formation of in the products, while the presence of a substance dissolved in water indicates the formation of
- 33- In the symbolic chemical equation, the symbol (dil.) indicates the use of acid, while the symbol (conc.) indicates the use of acid.
- 34- The chemical equation must be to verify the law of
- 35- In the balanced chemical equation, the total mass of the must be equal to the total mass of the
- 36- In the equation: $\text{PCl}_5 + 4\text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4 + 5\text{HCl}$

The total number of subscripts of atoms of the reactants is, while the total number of coefficients of the molecules of the products is

- 37- Two molecules of ammonia NH_3 are formed when molecule(s) of nitrogen N_2 react(s) with molecule(s) of hydrogen H_2 .
- 38- In the unbalanced equation: $\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ to equalize the number of atoms of C and H, multiply the coefficient of CO_2 x and H_2O x

4

Write the scientific term for each of the following statements

- 1- Energy transferred from one system to another due to the difference in their temperatures.

Lesson 4

- 2- The state reached by two systems with different temperatures after they come into contact and their temperatures become equal.

- 3- Thermal energy transfer through solid objects without particles change their position.

4- A measure of the ability of materials to conduct heat through them.

.....

5- Thermal energy transfer in fluids with the movement of their particles.

.....

6- Cool air blowing from the sea towards land during the daytime.

.....

7- Waves propagate in space in all directions at a speed reaching 300,000 km/s

.....

8- Transfer of infrared rays from the surfaces of hot objects without the need for material particles.

.....

9- A technique that uses a camera to detect thermal radiation emitted from objects and convert it into coloured images.

.....

Lesson 1

10- A change in the state or shape of a substance without changing its chemical composition.

.....

11- A change that results in formation of new substances with properties different from those of the original substances.

.....

12- A gas produced by the reaction of sodium bicarbonate with dilute acetic acid.

.....

13- Breaking the bonds between the atoms of the reacting substances (reactants) and forming new bonds between atoms of the produced substances (products).

.....

14- A white precipitate that becomes violet when it is exposed to sunlight.

.....

15- A solid substance produced from the reaction of oil with caustic soda solution.

.....

16- Change the colour of iron when it is exposed to moist atmospheric oxygen.

.....

Lesson 2

17- A symbolic representation of a chemical reaction using symbols and molecular formulas that shows the simplest integer ratio between the numbers of atoms or molecules of the reactants and the products of the reaction.

.....

18- A substance that increases the speed of a reaction without being consumed or changed.

.....

19- The law which states that matter is neither destroyed nor created from nothing, but it is transformed from one form to another.

.....

20- The scientist who formulated the law of conservation of mass.

.....

21- The law which states that the total mass of substances involved in a chemical reaction is equal to the total mass of the substances resulting from it.

.....

22- A symbolic chemical equation in which the number of atoms of each element of the reactants is equal to the number of atoms of the same element in the products.

.....

23- The numbers preceding the symbols of elements or molecular formulas of the compounds in a balanced symbolic chemical equation.

.....

24- The numbers located below the symbols of the elements that make up the molecule and represent the number of atoms in a single molecule.

5

Correct the underlined word:

Lesson 4

1. Heat is one of the forms of matter.
2. Heat transfers through solid objects from one end to another by convection.
3. When two identical copper cubes come into contact, the temperature of the first cube is 60°C and the second is 40°C , their temperatures will be 20°C at the thermal equilibrium.
4. Copper is the first element according to thermal conductivity among natural elements.
5. When heat transfers by radiation, hot water particles rise up and cold water particles go down.
6. The effect of sea breeze is more perceptible in spring.
7. Infrared rays have a chemical effect.
8. The idea of wearing dark clothes in winter is based on heat transfer by conduction.
9. When standing in front of a lit bulb, heat transfers to us by conduction.

Lesson 1

10. A chemical reaction between sulphuric acid and sodium bicarbonate is indicated by the formation of precipitate.
11. When silver nitrate solution is added to sodium chloride solution, a white precipitate of sodium nitrate is formed.
12. When magnesium oxide is exposed to sunlight, it becomes violet.
13. Copper sulphate solution is colourless.
14. The scientific name of caustic soda is sodium bicarbonate.
15. Copper rusts when exposed to moist atmospheric oxygen.

6

Mark (✓) or (X) for each statement, with correction:

Lesson 4

- 1- Thermal energy transfer from one system to another depending on the difference in temperature between them. ()
- 2- Heat transfers from the colder object to the hotter object. ()

- 3- A spoon becomes cold after it is used in stirring iced water because it loses heat to the ice water. ()
- 4- When a cube of metal at a temperature of 60°C is put in a basin of water at a temperature of 90°C , no change occurs in the temperature of water. ()
- 5- When stirring a cup of hot tea using a metal spoon, heat transfers to the hand by radiation. ()
- 6- Thermal equilibrium occurs when there is a difference in the quantity of heat. ()
- 7- Metals are thermal conductors. ()
- 8- Copper has greater thermal conductivity than silver. ()
- 9- The thermal conductivity of solid clay bricks is better than that of hollow clay bricks. ()
- 10- The heat generated in components of smartphone leads to reducing their performance. ()
- 11- Heat transfers through solids and liquids by conduction. ()
- 12- When air cools, its density decreases and it moves downwards. ()
- 13- The electric space heater is placed on the floor of the room to heat the air by conduction. ()

Lesson 1

- 14- Physical changes do not change the chemical composition of the substance. ()
- 15- The melting of the wax results in a new substance. ()
- 16- Chemical changes result in new substances whose properties differ from those of the original substances. ()
- 17- The change of milk into yogurt is a physical change. ()
- 18- The odours that appear during the process of cooking food are evidence of physical changes. ()
- 19- The change of colour and texture over time indicate a chemical reaction. ()
- 20- All chemical reactions are accompanied by the formation of bonds between the atoms of the molecules of the reactants. ()
- 21- Magnesium oxide powder is white in colour and does not dissolve in water. ()
- 22- Burning the sugar changes its apparent properties. ()

Lesson 2

- 23- In a chemical reaction, the atoms of the reactants are rearranged to form new products with the same number of atoms for each element. ()
- 24- In a chemical equation, the symbol $\rightarrow$ is placed between each two reactants. ()
- 25- In the symbolic chemical equation, the symbol (g) refers to the matter that is in its solid state. ()
- 26- In the equation of the reaction of magnesium with dilute hydrochloric acid, the symbol (cat.) is placed above the arrow. ()
- 27- The chemical equation must be balanced to verify the law of conservation of energy. ()
- 28- The scientist Robert Brown is called the father of chemistry. ()
- 29- The mass of a molecule of CO_2 is greater than the mass of a molecule of CO . ()
- 30- The total mass of the substances before the reaction is always greater than the total mass of the substances after the reaction. ()
- 31- The numbers that precede the symbols of elements or molecular formulas of compounds in a balanced equation are known as constants. ()
- 32- The subscript of ammonium group in $\text{NH}_4 \text{Cl}$ is equal to 4. ()
- 33- In the equation: $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$.
the total sum of subscripts of atoms of reactants and products is 6. ()
- 34- In the unbalanced equation: $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$.
to equalize the number of oxygen atoms, multiply the coefficient of $\text{O}_2 \times 3$. ()

7

How can you deduce the occurrence of the chemical reaction be indicated when?

Lesson 1

1- Baking soda is added to sulphuric acid.

.....

2- Silver nitrate solution is added to sodium chloride solution.

.....

3- Zinc plate is placed in a copper sulphate solution.

.....

4- Dilute hydrochloric acid is added to a strip of magnesium.

5- A strip of magnesium is heated in the air.

6- Sugar is burned.

7- Oil reacts with caustic soda.

8- Eggs are fried.

9- Iron is exposed to moist atmospheric oxygen.

10- An apple is cut into slices and left it in the air.

11- Fireworks are lit.

8 Write the number that indicates each of the following:

Lesson 2

(1) The number of oxygen atoms in a molecule of carbon dioxide.

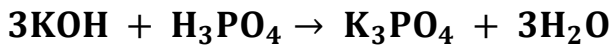
(2) Number of nitrogen atoms involved in the reaction: $6\text{Li} + \text{N}_2 \rightarrow 2\text{Li}_3\text{N}$

(3) The subscript of sulphur in $2\text{H}_2\text{SO}_4$

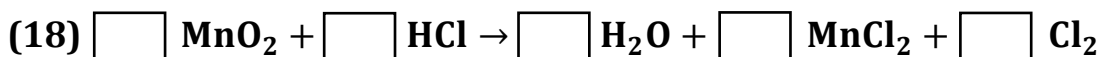
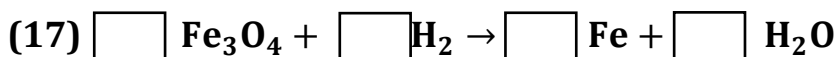
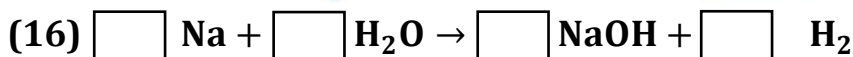
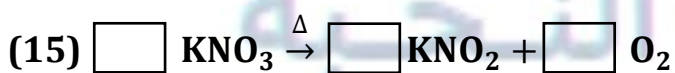
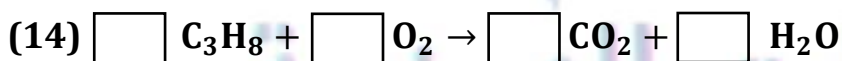
(4) Total sum of subscripts of the atomic groups in $(\text{NH}_4)_2\text{SO}_4$

(5) The sum of the coefficients in the following equation after balancing: $\text{N}_2\text{O}_5 \rightarrow \text{N}_2\text{O}_4 + \text{O}_2$

(6) The sum of subscripts of atoms of the reactants in the following equation:



9 Rewrite the following chemical equations after balancing them:



Write balanced symbolic equations which represent the following reactions, including the physical states of the reactants and products:

1- Burning of carbon in pure oxygen to form carbon dioxide.

.....

2- The reaction of baking soda with dilute hydrochloric acid to form a solution of sodium chloride, water and bubbles of carbon dioxide gas.

.....

3- Reaction of silver nitrate solution with sodium chloride solution to form sodium nitrate solution and a white precipitate of silver chloride.

.....

4- Reaction of zinc with blue copper sulphate solution to form colourless zinc sulphate solution and reddish-brown copper.

.....

5- The reaction of magnesium with dilute hydrochloric acid to form magnesium chloride salt dissolved in water and bubbles of hydrogen gas.

.....

6- The reaction of barium chloride solution with magnesium sulphate solution to form magnesium chloride solution and barium sulphate salt.

.....

7- Calcium hydroxide solution + Dilute nitric acid → Calcium nitrate solution + Water

.....

8- Magnesium burns in atmospheric oxygen to form a white powder of magnesium oxide.

.....

9- Carbon monoxide gas combines with oxygen gas to form carbon dioxide gas.

.....

10- Nitrogen + Hydrogen → Ammonia

.....

11- The reaction of solid magnesium oxide with an aqueous solution of hydrochloric acid to form water and magnesium chloride salt dissolved in water.

.....

12- Hydrogen sulphide solution + Sulphur dioxide gas → Solid sulphur Water

.....

13- The reaction of calcium phosphate salt with an aqueous solution of sulphuric acid to acid form a precipitate of calcium sulphate with an aqueous solution of phosphoric acid

.....

14- Combustion of propane gas C_3H_8 in oxygen to form condensed water vapour and carbon dioxide.

.....

15- Copper nitrate salt $\xrightarrow{\Delta}$ Copper oxide + Nitrogen dioxide gas + Oxygen gas.

.....

11 what is meant by (Define)

Lesson 4

Heat	.....
Thermal equilibrium	.....
Thermal conduction	.....
Thermal conductivity	.....
Thermal conductors	.....
Thermal insulators	.....

Thermal convection	.....
Sea breeze	.....
Electromagnetic Waves	.....
Thermal radiation	.....
Thermography	.....
Physical change	.....
Chemical change	.....
Chemical reaction	.....
Symbolic equation	.....
Law of conservation of mass	.....
Balanced chemical equation	.....
Catalysts	.....
Balanced chemical equation	.....
Catalysts	.....

Lesson 1

Lesson 2

Law of conservation of matter	.....
Law of conservation of mass	.....
Balanced symbolic equation	.....
Coefficients	.....
Subscripts	.....

12 Give reason for the following statement ?

Lesson 4

1- The concept of heat is different from the concept of temperature.

.....

2- Heat transfers from a hot body to a cold body.

.....

3- The refrigerator freezer is placed at the top of the refrigerator.

.....

4- Cooking pans are made of aluminum with wooden handles.

.....

5- Polystyrene panels are placed between bricks during building walls.

.....

6- It is preferred to use hollow clay bricks rather than solid clay bricks during constructing walls.

.....

7- The use of silver in cooling systems within smartphones.

.....

8- The eagle can fly in the air at great heights without flapping its wings, despite the Earth's gravitational force pulls it down.

.....

9- Heat does not transfer by convection through solid substances.

.....

10- It is preferred to place the electric space heater on the floor of the room.

.....

11- The occurrence of the sea breeze phenomenon.

.....

12- The sand on the beach is hotter than the sea water at noon.

.....

13- The heat of the Sun transfers to us through radiation.

.....

14- It is preferred to wear dark coloured clothes in winter and light coloured clothes in summer.

.....

15- Painting solar heater pipes in black colour.

.....

16- Firefighters wear shiny silver clothes.

.....

17- Snakes are able to hunt their preys at night.

.....

Lesson 1

18- The melting of a candle is considered a physical change, while the burning of coal is a chemical change.

.....

19- When a zinc plate is placed in a beaker containing a blue copper sulphate solution, the blue color disappears.

.....

20- A magnesium strip must be held with a tongs before lighting it with a flame.

.....

21- Ice melting is a physical change.

.....

22- Breaking of a bottle filled to the brim with water and tightly closed when placed in the freezer, is not a chemical reaction.

.....

23- Effervescence occurs when sodium bicarbonate is added to acetic acid.

.....

24- Formation of a white precipitate when silver nitrate solution is added to sodium chloride solution.

.....

25- The formation of gas bubbles when dilute hydrochloric acid is added to a strip of magnesium.

.....

26- During burning a strip of magnesium, a protective mask must be used.

.....

27- A strong odour is emitted when sugar is burned.

.....

28- Iron goes rusty when it is exposed to oxygen in moist air.

.....

Lesson 2

29- The chemical equation must be balanced.

.....

30- It is better to express a chemical reaction by using a balanced symbolic equation than a word equation.

.....

31- Balancing the equation: $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O}$ in this way: $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O}_2$ is a scientific error.

13 What happens when...?**Lesson 4**

1. A hot metal block is dipped in a beaker of cold water (according to the temperature of both the metal mass and the water).
2. Two non-isolated systems with different temperatures come into contact.
3. A hot drink at a temperature of 70°C is mixed with another drink at a temperature of 20°C .
4. A metal spoon is placed in a cup of hot tea.
5. Heating the end of a metal rod with small pins that are fixed on it with small pieces of wax.
6. Polystyrene insulating panels are used between the building walls during construction.

Lesson 1

7. Baking soda (sodium bicarbonate) is added to vinegar (dilute acetic acid).
8. Silver nitrate solution is added to sodium chloride solution.
9. A piece of zinc is added to the copper sulphate solution.
10. Heating a spoon with sugar on a flame for a period of time.

11. A liquid mixture of oil and caustic soda solution is heated with continuous stirring.

12. An iron nail is exposed to moist air.

13. Slices of apples are left in the air.

14. Exposing a silver chloride precipitate to sunlight.

15. Placing a magnesium strip in a test tube containing dilute hydrochloric acid.

14 Compare between...?

1-compare between thermal conduction, thermal convection and thermal radiation

2-compare between thermal conductors and thermal insulators

15 Variant questions

Lesson 4

1. Study then complete

Based on what you have studied, examine the figures in front of you and then answer:

what are the methods of heat transfer shown in the picture?

Figure (1)

Figure (2)

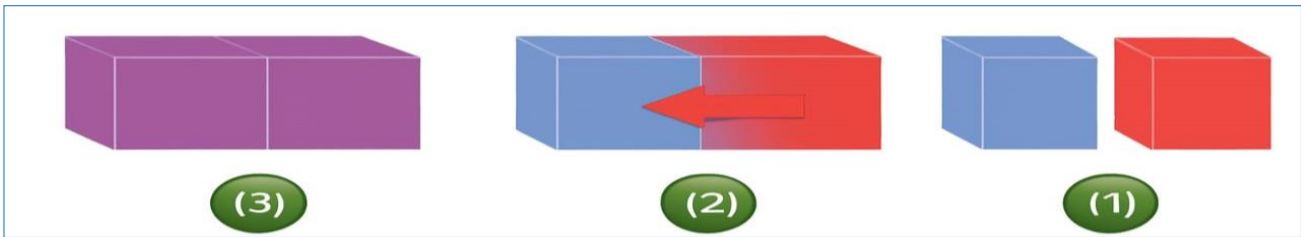
Figure (3)



- What is the difference between methods of heat transfer (1) and (3) ?

2. Study and concentrate :

Explain the following image in light of the concept of thermal equilibrium.



(1)

(2)

(3)

3. Study then answer :

In front of you two identical copper cubes touching each other

Figure (1)

- 1- When does thermal equilibrium occur between the two cubes?



Figure (1).

- 2- What is the expected temperature of the cubes when thermal equilibrium occurs?

- 3- Draw the direction of heat flow.

Figure (2)

Does heat transfer between the two cubes? Explain your answer.

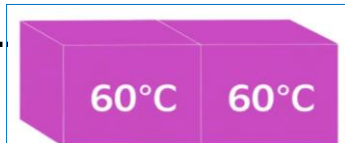
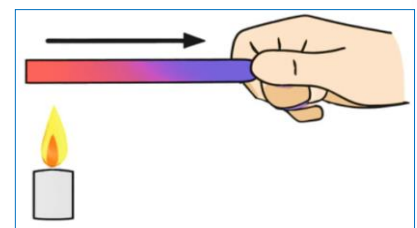


Figure (2)

4. Observe then determine:

- 1- Explain why your hand feels the heat of the flame

- 2- What is the material of the handle you are holding made of?



3- How did the heat transfer in this example?

4- What happens when you replace the rod you are holding with a wooden rod?
Explain your answer.

5. Observe the following picture well, which shows a substance in two different states in two beakers. Then answer:

1- Which of the two cups has a higher temperature? Why?

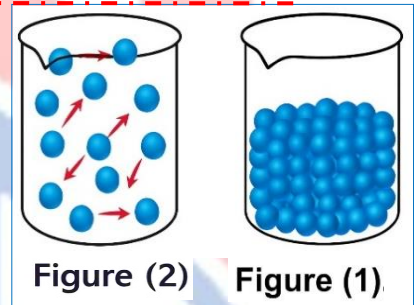


Figure (2) Figure (1)

2- What happens when the two cups touch each other?

6. Study then answer :

Explain how heat is transferred by convection

1-

2-

3-



7. Study then answer :

- The figure in front of you for solar heater.

Explain why the pipes of solar heaters are painted black.



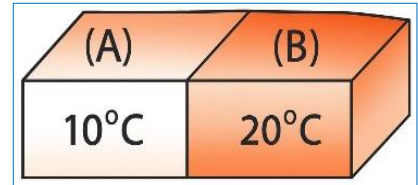
8. Questions

1- How does heat transfer in an electric oven? And why?



9. From the opposite figure:

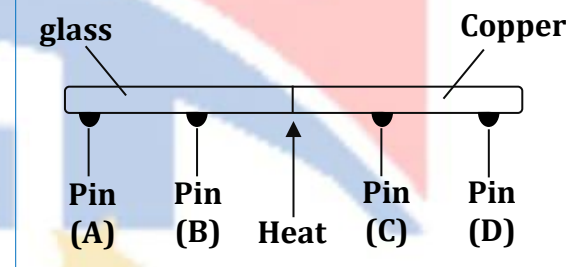
- 1- When does the thermal equilibrium occur between the two objects (A) and (B), which are made of the same material and have the same mass?



- 2- What is the expected temperature of the two objects when thermal equilibrium occurs?

10. The opposite figure shows four pins fixed in Copper and Glass rods that are heated by a single heat source.

Which pin will fall first? Explain your answer.



Lesson 1

11. What type of change occurs in each of the following, and what is the reason?



(1) Adding a quantity of vinegar to baking



(2) Moldy bread.



(3) Fireworks



(4) Water with tea leaves added to it.



(5) Adding saffron stigmas to rice



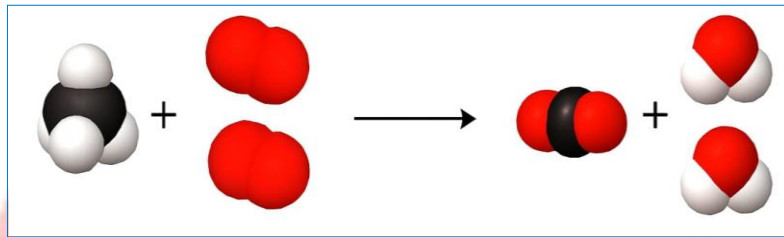
(6) Melting of candle

1- 2-

3- 4-

5-6-

12. Study then answer :



Methethene + Oxygen +

-The previous figure illustrates a chemical reaction.

(a) What happened to thereactants?

(b) How were the products formed?

(c) The chemical reaction is

13. Choose from column (B) the suitable formula from column (A) :-

(A) Element Compound		(B) (Chemical formula or chemical symbol)
1	Silver nitrate	Ⓐ HCl
2	Silver Chloride	Ⓑ CuSO ₄
3	Sodium Chloride	Ⓒ Mg
4	Copper Sulphate	Ⓓ MgO
5	Zinc Sulphate	Ⓔ NaHCO ₃
6	Hydrochloric acid	Ⓕ ZnSO ₄
7	Magnesium	Ⓖ AgNO ₃
8	Copper	Ⓗ NaOH
9	Hydrogen	Ⓘ NaCl
10	Magnesium Chloride	Ⓙ MgCl ₂
11	Magnesium Oxide	Ⓚ Cu
12	Sulphuric acid	Ⓛ AgCl

13	Sodium bicarbonate (Baking soda)	M H_2
14	Sodium hydroxide (Caustic Soda)	$\text{N H}_2\text{SO}_4$

14. Copper chloride solution reacts with sodium hydroxide solution to form sodium chloride solution and copper hydroxide compound, which is insoluble in water. How can the occurrence of this reaction be indicated, based on what you have studied?

15. Compare between the properties of table sugar before and after combustion.

16. What type of change does occur to each of a piece of apple and a piece of ice when left in the air? How can this be indicated?

17. You have the following substances:

- AgCl • NaCl • AgNO₃ • NaNO₃

Identify the reactants and products from these substances.

18. NaOH solution is added to each of copper sulphate solution and iron sulphate solution, separately.

How can they be distinguished despite the formation of a precipitate in both cases?

19. Apply the concept of chemical reaction to the reaction of producing ammonia gas NH₃ from nitrogen gas N₂ and hydrogen gas H₂

Lesson 2

20. The following figure illustrates a chemical reaction.

(a) Write the reaction equation

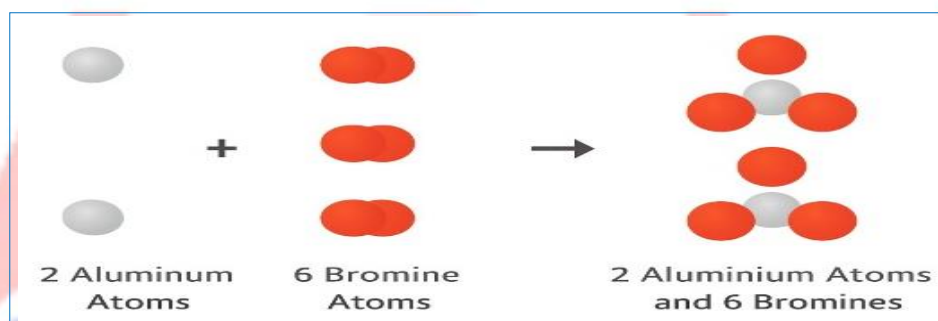
(b) Write the physical state of the reactants and products

-Find:

(c) The sum of the number of molecules of the reactants and products.

(d) The sum of the number of atoms of the reactants and products.

21. The figure illustrates a chemical reaction.



-Write the balanced reaction equation

22. Choose from column (B) the suitable for column (A)

	(A) Physical State or Meaning Symbol	(B) Symbol
1	Using a concentrated acid	Ⓐ S
2	Vapor	Ⓑ L
3	Using a catalyst	Ⓒ G
4	Aqueous solution (substance dissolved in water)	Ⓓ V
5	Gas	Ⓔ aq
6	Heating (Heat)	Ⓕ conc
7	Solid or precipitate	Ⓖ dil
8	Liquid	Ⓗ cat
9	Using a dilute acid	Ⓘ Δ

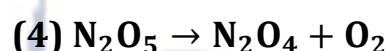
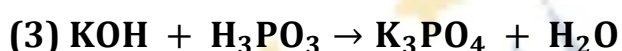
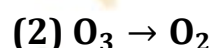
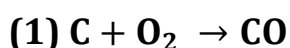
23. What happens when: A calcium chloride solution is added to a sodium sulphate solution?

Explain your answer with a balanced equation.

24. Choose from column (B) the suitable for column (A)

	(A) The compound	(B) Chemical formula or symbol
1	Sodium nitrate	Ⓐ HI
2	Hydrogen iodide	Ⓑ FeSO ₄
3	Iron sulphate	Ⓒ NH ₃
4	Ammonia	Ⓓ NaNO ₃

25. Balance the following symbolic equations:



26. Write the balanced symbolic equations expressing the following reactions, including the physical state of the substances and the reaction conditions:

1- Combustion of ethane gas C₂H₆ in oxygen to form condensed water vapour and carbon dioxide.

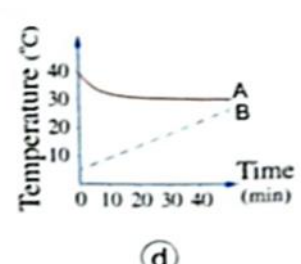
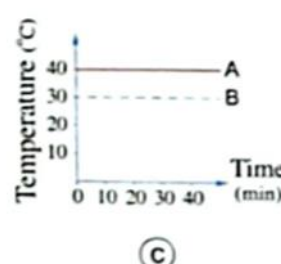
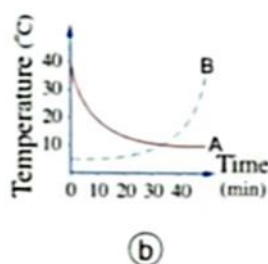
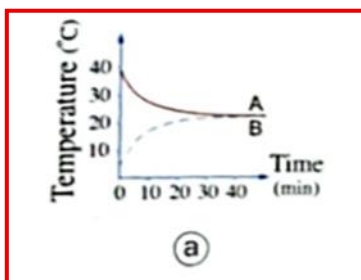
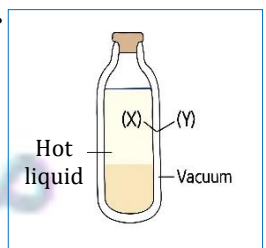
2- Heating mercury oxide powder HgO strongly to form mercury and oxygen gas.

3- Reaction of magnesium with dilute sulphuric acid to form magnesium sulphate salt dissolved in water and hydrogen gas bubbles.

1

Choose the correct answer:

- 1- When a tray of pies is removed from the oven and placed on a metal surface,
- (A) the pie absorbs heat from the tray.
 (B) the heat is transferred from the tray to the surrounding air only.
 (C) heat is transferred from the pie to the air and the tray.
 (D) heat is transferred from the tray to the air and the metal surface.
- 2- A lemon drink its temperature is 20°C was placed with a cube of ice, and after two minutes, the temperature of the drink became 8°C , the temperature of the remaining part of the ice cube was
- (A) 0°C (B) 2°C (C) 4°C (D) 8°C
- 3- What happens to the cold air outside a kettle when it comes into contact with its hot outer surface?
- (A) Its density decreases and it sinks downwards.
 (B) Its density decreases and rises upwards.
 (C) Its density increases and it sinks downwards.
 (D) Its density increases and it rises upwards.
- 4- The opposite figure shows a thermos flask with two walls (X) and (Y), containing a hot liquid. Which of the following is correct?
- (A) Heat is transferred from (X) to (Y) by conduction and convection.
 (B) Heat is transferred from (Y) to (X) by conduction only.
 (C) Heat is transferred from (X) to (Y) by radiation only.
 (D) Heat is transferred from (Y) to (X) by radiation and convection.
- 5- (A), (B) are two equal quantities of water, temperature of (A) is 40°C and that of (B) is 5°C . Which of the following graphs shows the change in temperature when they are mixed together?



Lesson 1

6- Which of the following expresses a chemical change?

- (A) Iodine sublimation. (B) The conversion of charcoal to ash.
(C) The heating of an iron rod. (D) The melting of ice.

7- The combustion (burning) of table sugar is indicated by the formation of

- (A) a solid matter and evolution of smoke.
(B) a white precipitate and evolution of smoke.
(C) green solution and reddish brown gas.
(D) white powder and bright light.

8- The following reactions were carried out:

- (1) Burning a strip of magnesium.
(2) Adding hydrochloric acid to magnesium.
(3) Adding sulphuric acid to baking soda.

Which of these reactions is accompanied by the release of gas?

- (A) (1) Only. (B) (2) Only. (C) (1) , (3). (D) (2) , (3).

9- Soap is formed by the reaction of

- (A) a oil with solid sodium hydroxide. (B) oil with sodium hydroxide solution.
(C) Coil with hydrochloric acid. (D) oil with silver nitrate solution.

10- All chemical reactions are accompanied by the following, except

- (A) breaking down the bonds between the molecules of the reactants.
(B) forming bonds between the molecules of the products.
(C) the formation of new substances.
(D) the release of heat.

Lesson 2

11- In the balanced equation: $\text{PCl}_5 + 4\text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4 + 5\text{HCl}$

What is the total number of coefficients of reactants molecules and the total number of subscripts of the products respectively?

- (A) 5,7 (B) 5,10 (C) 9,5 (D) 6,5

12- Which of the following expresses the physical state of the substances of the reaction between magnesium metal and hydrochloric acid to form magnesium chloride solution and hydrogen gas?

- (A) $\text{Mg}_{(g)} + \text{HCl}_{(\ell)} \rightarrow \text{MgCl}_{(\text{aq})} + \text{H}_{2(g)}$
 (B) $\text{Mg}_{(g)} + \text{HCl}_{(\text{aq})} \rightarrow \text{MgCl}_{2(\ell)} + \text{H}_{2(g)}$
 (C) $\text{Mg}_{(s)} + \text{HCl}_{(\ell)} \rightarrow \text{MgCl}_{2(\ell)} + \text{H}_{2(\ell)}$
 (D) $\text{Mg}_{(s)} + \text{HCl}_{(\text{aq})} \rightarrow \text{MgCl}_{2(\text{aq})} + \text{H}_{2(g)}$

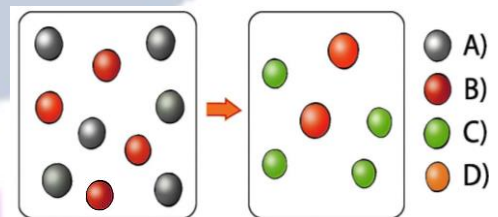
13- Which of the following verifies the law of conservation of mass when magnesium reacts with oxygen to form magnesium oxide?

Choices	MgO	O ₂	Mg
(A)	15.36 g	3.2 g	4.8 g
(B)	1.6 g	4.8 g	3.28
(C)	8g	3.2g	4.8 g
(D)	7.4 g	4.8 g	3.2 g

14- The following figure illustrates a chemical reaction:

What is the balanced symbolic equation which represents this reaction?

- (A) $6A + 4B \rightarrow 4C + 2D$
 (B) $6A + 4B \rightarrow C + D$
 (C) $A + 2B \rightarrow 2C + D$
 (D) $3A + 2B \rightarrow C2 + D$



2 Answer the following:

Lesson 4

1- What are the factors that affect the temperature of a body (system) ?

1-The mass of the substance/ 2- the type of the substance /3-the state of the substance

2- Explain how the properties of a material affect the rate of heat transfer by conduction?

Materials with high thermal conductivity (like metals) transfer heat quickly, while those with low thermal conductivity (like wood) transfer heat slowly.

3- Why does heat not transfer in a vacuum by conduction or convection?

Because in vacuum there are no material particles so heat transfer by radiation while conduction and convection need material particles

4- How does the method of heat transfer differ in metals from that in air?

In metals heat transfer by conduction while in air transfer by convection or radiation

5- Explain why:

- Firefighters wear shiny silver suits.

To reflect infrared rays away from their bodies.

- Polystyrene boards are used between hollow bricks when constructing building walls.

Because polystyrene and the air in the brick cavities are heat insulators which prevent rapid change in temperature inside the buildings when the outside temperature changes.

6- What do you observe when ?

Lesson 1,2

a-Burning table sugar.

It turns black with the evolution of smoke and a strong odour (caramel smell).

b-Heating a mixture of caustic soda and oil with continuous stirring.

The consistency of liquid mixture changes and turns into solid soap.

c-Slices of apple or potato are left exposed to the open air.

Its colour turns to brown.

7- How do you infer that a chemical reaction has occurred in the following experiments

a-Frying an egg.

The colour and texture of the white part (egg whites) and yellow part (egg yolk)

of eggs change.

b-Igniting fireworks.

Emission of light and heat.

c-Adding a piece of a magnesium strip to a test tube containing dilute hydrochloric acid.

Formation of gas bubbles of hydrogen gas.

8- How do we infer the occurrence of a chemical reaction?

By formation of precipitate ,evolution of gas ,colour change, emission of light and heat , emission of odor and change in consistency

9- What are the steps of a chemical reaction?

1-Step one breaking the bonds between the atoms of reactant

2-Step two atoms are rearranged and combined together with new bonds to form products

10- What are the laboratory safety precautions when burning a magnesium ribbon?

1-Hold the magnesium strip with heat-resistant tongs to avoid burns during its combustion.

2-Use a protective mask to avoid damage from the bright light.

3-Do not touch the formed white powder immediately after the reaction as it will be hot.

11- Mention examples of some chemical reactions that occur in daily life.

1-Frying eggs and Ignition of fireworks

2-Reaction of oxygen in the air with an apple when it is cut into slices and left in the air

3-Iron rusts when it is exposed to atmospheric oxygen in moist (humid) air

3

Complete the following sentences:

Lesson 4

1- Heat transfers in three different ways: conduction, convection and radiation

2- Energy transfers from a system with a **higher** temperature to a system with a lower temperature.

3- The sun's heat reaches us by radiation , while a heater's heat reaches us by radiation and convection

- 4- A **thermographic** camera can sense the **thermal** radiation emitted by objects and convert it into color images
- 5- Heat is transferred from one point to another in **solid** objects by **conduction**
- 6- Thermal conductors include **copper** while thermal insulators include **plastic**
- 7- Cooking pot handles are made of **wood** or **plastic**, while the pots themselves are made of **metals (aluminum)**
- 8- Silver is preceded by **diamond** and followed by **copper** in thermal conductivity.
- 9- **Polystyrene** panels are placed between bricks to prevent **rapid** changes in temperatures inside the buildings.
- 10- Heat is transferred by conduction as a result of **collision** among the particles of matter in contact with each other, while it is transferred by convection as a result of **movement** of the fluid particles.
- 11- Heat transfers in iron by **conduction**, while it transfers in water by **convection**
- 12- The density of hot water is **low**, while the density of cold water is **high**
- 13- Sea breeze occurs as a result of the movement of hot air of the **land** which replaced by cold air of the **sea**
- 14- The phenomenon of sea breeze is based on heat transfer by **convection**, while the cooling systems of electronic devices depend on heat transfer by **conduction**
- 15- Heat transfers in gases by **convection** and **radiation**
- 16- Dissolving sugar in water is a **physical** change, while burning the sugar is a **chemical** change.
- 17- Chemical reaction includes the change of **reactant** into **product**
- 18- One of the indications of chemical reactions is the formation of **precipitate** that does not dissolve in water and emission of light or **heat**
- 19- The scientific name of baking soda is **sodium bicarbonate**, while the scientific name of vinegar is **dilute acetic acid**
- 20- The reaction of baking soda with vinegar is indicated by the formation of **bubbles** of **carbon dioxide** gas.
- 21- When silver chloride precipitate is exposed to sunlight, it turns from to **white** colour **violet** colour
- 22- The colour of copper sulphate solution is **blue**, while zinc sulphate solution is **colourless**

Lesson 1

- 23- When zinc is added to copper sulphate solution, zinc sulphate solution is formed and copper is deposited.
- 24- The combustion of a magnesium strip in the air is accompanied by the emission light of and heat
- 25- Silver chloride insoluble in water, while magnesium oxide soluble in water.
- 26- The colour of sugar before burning is white while its colour after burning is black
- 27- When the mixture of oil and sodium hydroxide solution is heated, it is converted from liquid state to solid state.
- 28- Soap is formed due to the reaction of oil with sodium hydroxide solution
- 29- When eggs are fried, the colour and texture of each of white part (egg whites) and yellow part (egg yolk) change, this indicates the occurrence of the chemical reaction.

Lesson 2

- 30- In the chemical symbolic equation, the symbol (ℓ) indicates that the substance is in its liquid state, while the symbol (aq) indicates that the substance is present in the form of an aqueous solution.
- 31- In the equation of heating copper carbonate to obtain carbon dioxide, the symbol Δ written on the reaction arrow and the symbol (g) written below to the right of the formula CO_2
- 32- The occurrence of effervescence during the chemical reaction indicates the formation of gas in the products, while the presence of a substance dissolved in water indicates the formation of aqueous solution
- 33- In the symbolic chemical equation, the symbol (dil.) indicates the use of dilute acid, while the symbol (conc.) indicates the use of concentrated acid.
- 34- The chemical equation must be to balanced verify the law of conservation of mass (conservation of matter)
- 35- In the balanced chemical equation, the total mass of the reactants must be equal to the total mass of the products
- 36- In the equation: $\text{PCl}_5 + 4\text{H}_2\text{O} \rightarrow \text{H}_3\text{PO}_4 + 5\text{HCl}$

The total number of subscripts of atoms of the reactants is 9, while the total number of coefficients of the molecules of the products is 6

- 37- Two molecules of ammonia NH_3 are formed when 1 molecule(s) of nitrogen N_2 react(s) with 3 molecule(s) of hydrogen H_2 .

38- In the unbalanced equation: $\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ to equalize the number of atoms of C and H, multiply the coefficient of CO_2 x 2 and H_2O x 3

4

Write the scientific term for each of the following statements

1- Energy transferred from one system to another due to the difference in their temperatures.

Lesson 4

Heat

2- The state reached by two systems with different temperatures after they come into contact and their temperatures become equal.

Thermal equilibrium

3- Thermal energy transfer through solid objects without particles change their position.

Thermal conduction

4- A measure of the ability of materials to conduct heat through them.

Thermal conductivity

5- Thermal energy transfer in fluids with the movement of their particles.

Thermal convection

6- Cool air blowing from the sea towards land during the daytime.

Sea breeze

7- Waves propagate in space in all directions at a speed reaching 300,000 km/s

Electromagnetic waves

8- Transfer of infrared rays from the surfaces of hot objects without the need for material particles.

Thermal radiation

9- A technique that uses a camera to detect thermal radiation emitted from objects and convert it into coloured images.

Thermography

Lesson 1

10- A change in the state or shape of a substance without changing its chemical composition.

Physical change

11- A change that results in formation of new substances with properties different from those of the original substances.

Chemical change

12- A gas produced by the reaction of sodium bicarbonate with dilute acetic acid.

Carbon dioxide gas

13- Breaking the bonds between the atoms of the reacting substances (reactants) and forming new bonds between atoms of the produced substances (products).

Chemical reaction

14- A white precipitate that becomes violet when it is exposed to sunlight.

Silver chloride

15- A solid substance produced from the reaction of oil with caustic soda solution.

Soap

16- Change the colour of iron when it is exposed to moist atmospheric oxygen.

Rusting of iron

Lesson 2

17- A symbolic representation of a chemical reaction using symbols and molecular formulas that shows the simplest integer ratio between the numbers of atoms or molecules of the reactants and the products of the reaction.

The symbolic equation

18- A substance that increases the speed of a reaction without being consumed or changed.

The catalyst

19- The law which states that matter is neither destroyed nor created from nothing, but it is transformed from one form to another.

The law of conservation of matter

20- The scientist who formulated the law of conservation of mass.

Antoine Lavoisier

21- The law which states that the total mass of substances involved in a chemical reaction is equal to the total mass of the substances resulting from it.

The law of conservation of mass

22- A symbolic chemical equation in which the number of atoms of each element of the reactants is equal to the number of atoms of the same element in the products.

The balanced symbolic equation

23- The numbers preceding the symbols of elements or molecular formulas of the compounds in a balanced symbolic chemical equation.

The coefficients

24- The numbers located below the symbols of the elements that make up the molecule and represent the number of atoms in a single molecule.

The subscripts

5

Correct the underlined word:

Lesson 4

- Heat is one of the forms of matter. energy
- Heat transfers through solid objects from one end to another by convection.
conduction
- When two identical copper cubes come into contact, the temperature of the first cube is 60°C and the second is 40°C , their temperatures will be 20°C at the thermal equilibrium. 50°C
- Copper is the first element according to thermal conductivity among natural elements. Diamond
- When heat transfers by radiation, hot water particles rise up and cold water particles go down. by convection
- The effect of sea breeze is more perceptible in spring. summer
- Infrared rays have a chemical effect. thermal
- The idea of wearing dark clothes in winter is based on heat transfer by conduction. radiation
- When standing in front of a lit bulb, heat transfers to us by conduction.

Lesson 1

convection and radiation

10. A chemical reaction between sulphuric acid and sodium bicarbonate is indicated by the formation of precipitate. gas bubbles
11. When silver nitrate solution is added to sodium chloride solution, a white precipitate of sodium nitrate is formed. silver chloride
12. When magnesium oxide is exposed to sunlight, it becomes violet.

silver chloride

13. Copper sulphate solution is colourless. blue
14. The scientific name of caustic soda is sodium bicarbonate. sodium hydroxide
15. Copper rusts when exposed to moist atmospheric oxygen. Iron

6

Mark (✓) or (X) for each statement, with correction:

Lesson 4

- 1- Thermal energy transfer from one system to another depending on the difference in temperature between them. (✓)
- 2- Heat transfers from the colder object to the hotter object. (X) the hotter object to the colder
- 3- A spoon becomes cold after it is used in stirring iced water because it loses heat to the ice water. (✓)
- 4- When a cube of metal at a temperature of 60°C is put in a basin of water at a temperature of 90°C , no change occurs in the temperature of water. (X) decreasing occurs in the temperature of water
- 5- When stirring a cup of hot tea using a metal spoon, heat transfers to the hand by radiation. (X) by conduction
- 6- Thermal equilibrium occurs when there is a difference in the quantity of heat. (X) when the quantity of heat is equal
- 7- Metals are thermal conductors. (✓)
- 8- Copper has greater thermal conductivity than silver. (X) has lower
- 9- The thermal conductivity of solid clay bricks is better than that of hollow clay bricks. (✓)
- 10- The heat generated in components of smartphone leads to reducing their performance. (✓)
- 11- Heat transfers through solids and liquids by conduction. (X) gases and liquids by convection

- 12- When air cools, its density decreases and it moves downwards. (X) **Its density increases**
- 13- The electric space heater is placed on the floor of the room to heat the air by conduction. (X) **by convection**

Lesson 1

- 14- Physical changes do not change the chemical composition of the substance. (✓)
- 15- The melting of the wax results in a new substance. (X) **The combustion of wax**
- 16- Chemical changes result in new substances whose properties differ from those of the original substances. (✓)
- 17- The change of milk into yogurt is a physical change. (X) **a chemical change**
- 18- The odours that appear during the process of cooking food are evidence of physical changes. (X) **chemical changes.**
- 19- The change of colour and texture over time indicate a chemical reaction. (✓)
- 20- All chemical reactions are accompanied by the formation of bonds between the atoms of the molecules of the reactants. (X) **accompanied by the breaking of bonds**
- 21- Magnesium oxide powder is white in colour and does not dissolve in water. (X) **and dissolves in water**
- 22- Burning the sugar changes its apparent properties. (✓)

Lesson 2

- 23- In a chemical reaction, the atoms of the reactants are rearranged to form new products with the same number of atoms for each element. (✓)
- 24- In a chemical equation, the symbol $\rightarrow$ is placed between each two reactants. (X) **the symbol +**
- 25- In the symbolic chemical equation, the symbol (g) refers to the matter that is in its solid state. (X) **in its gaseous state**
- 26- In the equation of the reaction of magnesium with dilute hydrochloric acid, the symbol (cat.) is placed above the arrow. (X) **the symbol (dil.)**
- 27- The chemical equation must be balanced to verify the law of conservation of energy. (X) **the law of conservation of matter (the law of conservation of mass)**
- 28- The scientist Robert Brown is called the father of chemistry. (X) **The scientist Antoine Lavoisier**

29- The mass of a molecule of CO_2 is greater than the mass of a molecule of CO .

(✓)

30- The total mass of the substances before the reaction is always greater than the total mass of the substances after the reaction. (X) **always equals**

31- The numbers that precede the symbols of elements or molecular formulas of compounds in a balanced equation are known as constants. (X) **as coefficients**

32- The subscript of ammonium group in $\text{NH}_4 \text{Cl}$ is equal to 4. (X) **equal to 1**

33- In the equation: $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$.

the total sum of subscripts of atoms of reactants and products is 6. (X) **and products is 8**

34- In the unbalanced equation: $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$.

to equalize the number of oxygen atoms, multiply the coefficient of $\text{O}_2 \times 3$. (X) **coefficient of $\text{O}_2 \times 2$**

7

How can you deduce the occurrence of the chemical reaction be indicated when?

Lesson 1

1- Baking soda is added to sulphuric acid.

The occurrence of effervescence with evolution of gas bubbles of carbon dioxide gas.

2- Silver nitrate solution is added to sodium chloride solution.

Formation of a white precipitate of silver chloride, which turns violet when exposed to sunlight.

3- Zinc plate is placed in a copper sulphate solution.

The blue colour of the copper sulphate solution disappears, and reddish-brown copper is deposited over the zinc plate.

4- Dilute hydrochloric acid is added to a strip of magnesium.

Formation of gas bubbles of hydrogen gas.

5- A strip of magnesium is heated in the air.

The strip glows with a bright light accompanied by heat emission, and converts into a white powder.

6- Sugar is burned.

It turns black with the evolution of smoke and a strong odour (caramel smell).

7- Oil reacts with caustic soda.

The liquid mixture turns into solid soap.

8- Eggs are fried.

The colour and texture of the white part (egg whites) and yellow part (egg yolk) of eggs change.

9- Iron is exposed to moist atmospheric oxygen.

The iron rusts and changes its colour.

10- An apple is cut into slices and left it in the air.

Its colour turns to brown.

11- Fireworks are lit.

Emission of light and heat.

8 Write the number that indicates each of the following:

Lesson 2

(1) The number of oxygen atoms in a molecule of carbon dioxide. 2

(2) Number of nitrogen atoms involved in the reaction: $6\text{Li} + \text{N}_2 \rightarrow 2\text{Li}_3\text{N}$ 2

(3) The subscript of sulphur in $2\text{H}_2\text{SO}_4$ 1

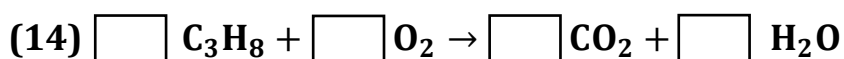
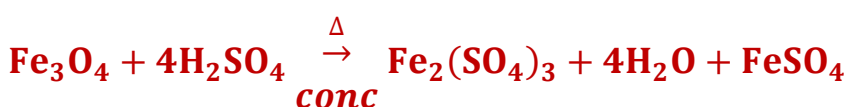
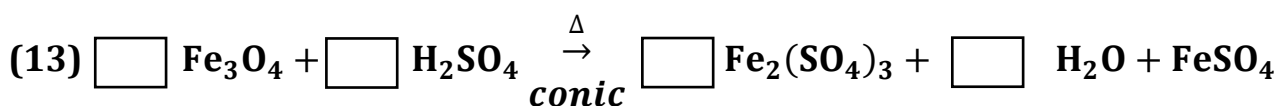
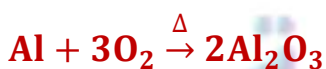
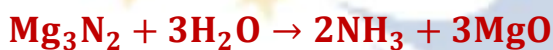
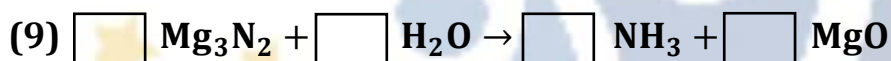
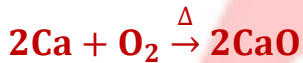
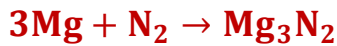
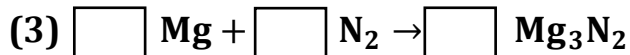
(4) Total sum of subscripts of the atomic groups in $(\text{NH}_4)_2\text{SO}_4$ 3

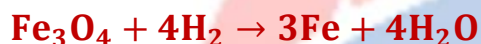
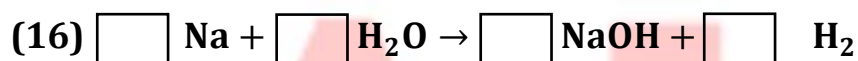
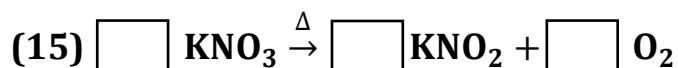
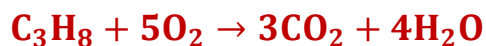
(5) The sum of the coefficients in the following equation after balancing: $\text{N}_2\text{O}_5 \rightarrow \text{N}_2\text{O}_4 + \text{O}_2$ 5

(6) The sum of subscripts of atoms of the reactants in the following equation: $3\text{KOH} + \text{H}_3\text{PO}_4 \rightarrow \text{K}_3\text{PO}_4 + 3\text{H}_2\text{O}$ 11

9 Rewrite the following chemical equations after balancing them:



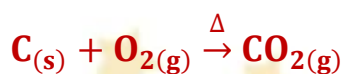




10

Write balanced symbolic equations which represent the following reactions, including the physical states of the reactants and products:

1- Burning of carbon in pure oxygen to form carbon dioxide.



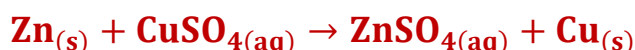
2- The reaction of baking soda with dilute hydrochloric acid to form a solution of sodium chloride, water and bubbles of carbon dioxide gas.



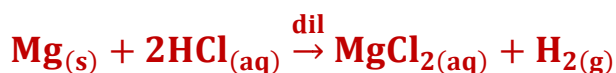
3- Reaction of silver nitrate solution with sodium chloride solution to form sodium nitrate solution and a white precipitate of silver chloride.



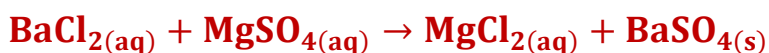
4- Reaction of zinc with blue copper sulphate solution to form colourless zinc sulphate solution and reddish-brown copper.



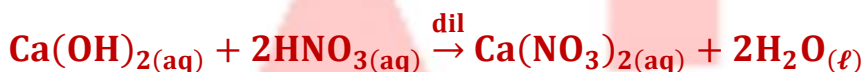
5- The reaction of magnesium with dilute hydrochloric acid to form magnesium chloride salt dissolved in water and bubbles of hydrogen gas.



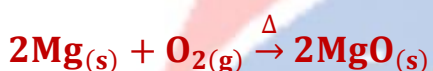
6- The reaction of barium chloride solution with magnesium sulphate solution to form magnesium chloride solution and barium sulphate salt.



7- Calcium hydroxide solution + Dilute nitric acid → Calcium nitrate solution + Water



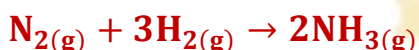
8- Magnesium burns in atmospheric oxygen to form a white powder of magnesium oxide.



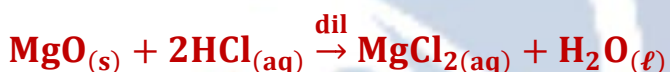
9- Carbon monoxide gas combines with oxygen gas to form carbon dioxide gas.



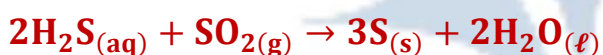
10- Nitrogen + Hydrogen → Ammonia



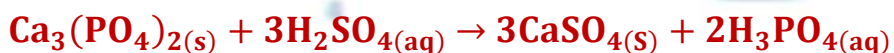
11- The reaction of solid magnesium oxide with an aqueous solution of hydrochloric acid to form water and magnesium chloride salt dissolved in water.



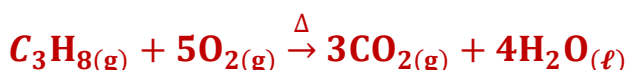
12- Hydrogen sulphide solution + Sulphur dioxide gas → Solid sulphur Water



13- The reaction of calcium phosphate salt with an aqueous solution of sulphuric acid to acid form a precipitate of calcium sulphate with an aqueous solution of phosphoric acid



14- Combustion of propane gas C_3H_8 in oxygen to form condensed water vapour and carbon dioxide.



15- Copper nitrate salt $\xrightarrow{\Delta}$ Copper oxide + Nitrogen dioxide gas + Oxygen gas.



11 what is meant by (Define)

Lesson 4

Heat	<u>The energy that is transferred from one system to another or to the surroundings due to a difference in their temperatures.</u>
Thermal equilibrium	<u>The state reached by two systems with different temperatures after they come into contact and their temperatures become equal.</u>
Thermal conduction	<u>The transfer of thermal energy through solid objects from one point to another without the particles moving from their positions.</u>
Thermal conductivity	<u>The measure for the extent to which a substance can conduct heat through it.</u>
Thermal conductors	<u>They are good heat-conducting substances (their thermal conductivity is high).</u>
Thermal insulators	<u>They are poor heat-conducting substances (their thermal conductivity is low).</u>
Thermal convection	<u>The transfer of thermal energy in fluids with the movement of their particles.</u>
Sea breeze	<u>Cool air (breeze) blowing from the sea towards the land during the daytime.</u>
Electromagnetic Waves	<u>Waves that propagate (travel) through space at very high speeds reaching 300,000 km/s in all directions.</u>
Thermal radiation	<u>The transfer of infrared radiation from the surfaces of objects, especially hot objects, without the need for material particles.</u>
Thermography	<u>A technique that uses a camera to detect the thermal radiation (infrared rays) emitted from objects and convert it into</u>

	<u>coloured images, the colours in these images depend on changes in the object's temperature.</u>
Physical change	<u>A change in the state or shape of a substance without changing its chemical composition.</u>
Chemical change	<u>A change that results in new substances with chemical properties different from those of the original substances.</u>
Chemical reaction	<u>The process of breaking the bonds between atoms of the reacting substances (reactants) and forming new bonds between atoms of the produced substances (products).</u>
Symbolic equation	<u>It is a symbolic representation of the chemical reaction, showing the reactants and the products by using symbols and molecular formulas, with the simplest integer ratio between the numbers of atoms or molecules entering and resulting from the reaction.</u>
Catalyst	<u>A substance that increases the speed of the reaction without being consumed or changed.</u>
Law of conservation of matter	<u>Matter is neither destroyed nor created from nothing, but it is transformed from one form to another.</u>
Law of conservation of mass	<u>The total mass of the substances involved in the chemical reaction is equal to the total mass of the substances resulting from it.</u>
Balanced symbolic equation	<u>A symbolic chemical equation in which the number of atoms of each element of the reactants is equal to the number of atoms of the same element in the products.</u>
Coefficients	<u>The numbers that precede the symbols of the elements or the molecular formulas of the compounds in the balanced symbolic equation.</u>

Lesson 1

Lesson 2

Subscripts

The numbers located below the symbols of the elements that make up the molecule and represent the number of atoms in a single molecule.

12 Give reason for the following statement ?

Lesson 4

1- The concept of heat is different from the concept of temperature.

Because heat is energy that transfers from one system to another due to a difference in their temperatures, while temperature indicates the degree of hotness or coldness of an object and is considered as the measure of the average kinetic energy of its particles.

1- Heat transfers from a hot body to a cold body.

Because thermal energy flows from system with higher temperature to the system with lower temperature

2- The refrigerator freezer is placed at the top of the refrigerator.

To ensure heat distribution throughout the refrigerator as the denser cold air sinks to the bottom and allowing the lighter warm air to rise to the top.

3- The difference between the concept of heat and the concept of temperature.

Because heat is energy that transfers from one system to another due to a difference in their temperatures, while temperature indicates the degree of hotness or coldness of an object and is considered as the measure of the average kinetic energy of its particles.

4- Cooking pans are made of aluminum with wooden handles.

Because aluminum is a thermal conductor, while wood is a thermal insulator.

5- Polystyrene panels are placed between bricks during building walls.

Because polystyrene is a thermal insulator substance that helps to avoid rapid temperature changes inside buildings when temperatures change outside, that leads to reducing air conditioning costs within the buildings.

6- It is preferred to use hollow clay bricks rather than solid clay bricks during constructing walls.

Because the thermal conductivity of the air present in the hollow spaces of hollow bricks is approximately 20 times less than that of the clay brick substance.

7- The use of silver in cooling systems within smartphones.

To get rid of the heat generated within the internal components, which may lead to reduce performance and may damage them

8- The eagle can fly in the air at great heights without flapping its wings, despite the Earth's gravitational force pulls it down.

Because the warm air convection currents rising from the Earth's surface cause it to rise upwards, which is equal to the gravitational force and keeps the eagle floating in the air

9- Heat does not transfer by convection through solid substances.

Because convection currents transfer through the movement of particles in a substance, and the particles in solid substances do not move from their position.

10- It is preferred to place the electric space heater on the floor of the room.

To ensure the distribution of heat throughout the room where heat is transferred from the space heater to the surrounding air, causing the warmer, less dense air to rise to the top while the cooler, denser air moves downwards (to sink).

11- The occurrence of the sea breeze phenomenon.

Due to the fact that land heats up more quickly than water during the day, this is due to the lower specific heat of land compared to that of sea water.

12- The sand on the beach is hotter than the sea water at noon.

Because the specific heat of the sand is lower than that of water.

13- The heat of the Sun transfers to us through radiation.

Because heat transfer by radiation does not require the presence of material particles

14- It is preferred to wear dark coloured clothes in winter and light coloured clothes in summer.

Because dark coloured clothes absorbs infrared radiation better than light coloured clothes.

15- Painting solar heater pipes in black colour.

To increase its absorption of infrared radiation so the temperature of the water within it rises

16- Firefighters wear shiny silver clothes.

Because shiny objects reflect infrared rays well.

17- Snakes are able to hunt their preys at night.

Because they receive infrared rays emitted from the bodies of preys through sensory receptors located at the front of their head.

Lesson 1

18- The melting of a candle is considered a physical change, while the burning of coal is a chemical change.

Because melting of a candle is not accompanied by a change in chemical composition while burning of coal accompanied by a change in chemical composition

19- When a zinc plate is placed in a beaker containing a blue copper sulphate solution, the blue color disappears.

Due to the formation of the colourless zinc sulphate solution ZnSO_4

20- A magnesium strip must be held with a tongs before lighting it with a flame.

To avoid burns during its combustion.

21- Ice melting is a physical change.

Because it is not accompanied by a change in chemical composition.

22- Breaking of a bottle filled to the brim with water and tightly closed when placed in the freezer, is not a chemical reaction.

Because the expansion of water during freezing does not lead to a change in the chemical composition of water or glass

23- Effervescence occurs when sodium bicarbonate is added to acetic acid.

Due to the occurrence of a chemical reaction, accompanied by the evolution of carbon dioxide gas.

24- Formation of a white precipitate when silver nitrate solution is added to sodium chloride solution.

Due to the occurrence of a chemical reaction that results in the formation of silver chloride, which does not dissolve in water

25- The formation of gas bubbles when dilute hydrochloric acid is added to a strip of magnesium.

Due to the occurrence of a chemical reaction, resulting in the evolution of hydrogen gas.

26- During burning a strip of magnesium, a protective mask must be used.

To avoid the damage from the bright light

27- A strong odour is emitted when sugar is burned.

Due to the occurrence of a chemical reaction that results in the formation of caramel.

28- Iron goes rusty when it is exposed to oxygen in moist air.

Due to the occurrence of a chemical reaction between iron and moist atmospheric oxygen.

Lesson 2

29- The chemical equation must be balanced.

To verify the law of conservation of matter (conservation of mass)

30- It is better to express a chemical reaction by using a balanced symbolic equation than a word equation.

Because the balanced symbolic equation shows the type and number of atoms of the elements involved in the composition of both the reactants and the products.

31- Balancing the equation: $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O}$ in this way: $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O}_2$ is a scientific error.

Because the balancing should be accomplished by changing the coefficient not the subscripts

13 What happens when...?

Lesson 4

1. A hot metal block is dipped in a beaker of cold water (according to the temperature of both the metal mass and the water).

The temperature of the metal block decreases while the temperature of the water increases until they reach thermal equilibrium.

2. Two non-isolated systems with different temperatures come into contact.

Heat transfers from the system at a higher temperature to the system at a lower temperature until they reach thermal equilibrium

3. A hot drink at a temperature of 70°C is mixed with another drink at a temperature of 20°C

The temperature of the hot drink decreases while the temperature of the cold drink increases, until their temperatures are equal when thermal equilibrium is reached.

4. A metal spoon is placed in a cup of hot tea.

Heat transfers from the hot tea to the spoon by conduction

5. Heating the end of a metal rod with small pins that are fixed on it with small pieces of wax.

The pins fall one by one from the closest end to the heating source to the furthest end

6. Polystyrene insulating panels are used between the building walls during construction.

Thermal insulation increases, preventing the feeling of rapid temperature changes outside the building and reducing the cost of air conditioning inside the building.

Lesson 1

7. Baking soda (sodium bicarbonate) is added to vinegar (dilute acetic acid).

Effervescence occurs with evolution of gas bubbles of carbon dioxide gas.

8. Silver nitrate solution is added to sodium chloride solution.

A white precipitate of silver chloride is formed, which turns violet when exposed to sunlight.

9. A piece of zinc is added to the copper sulphate solution.

The blue colour of the copper sulphate solution disappears, and reddish-brown copper is deposited over the zinc plate.

10. Heating a spoon with sugar on a flame for a period of time .

A solid black substance (carbon) is formed, with smoke and a strong odour

11. A liquid mixture of oil and caustic soda solution is heated with continuous stirring.

The liquid consistency changes, and solid soap is formed

12. An iron nail is exposed to moist air.

The nail rusts due to its reaction with moist atmospheric oxygen

13. Slices of apples are left in the air.

The colour of apple slices turn brown.

14. Exposing a silver chloride precipitate to sunlight.

The colour will change into violet

15. Placing a magnesium strip in a test tube containing dilute hydrochloric acid.

Formation of hydrogen gas H_2 bubbles

14 Compare between...?

1-compare between thermal conduction, thermal convection and thermal radiation

Thermal conduction	Thermal convection	Thermal radiation
<u>The transfer of thermal energy through solid objects from one point to another, without the particles moving from their positions</u>	<u>The transfer of thermal energy through fluids with the movement of their particles</u>	<u>The transfer of thermal energy from the surfaces of hot objects without the need for material particles</u>
<u>Heat transfers from the objects (point) with the</u>	<u>Heat transfers upwards (from the region of least</u>	<u>Heat transfers in all directions</u>

<u>highest temperature to the objects (point) with the lowest temperature, till thermal equilibrium occurs</u>	<u>density in the fluid to the region of greatest density)</u>	
<u>It takes place as a result of the contact between particles of solids</u>	<u>It takes place as a result of the movement of fluid particles</u>	<u>It takes place without the need for a material medium</u>
<u>It occurs in solid matter only</u>	<u>It occurs in liquid and gaseous matter (fluids)</u>	<u>It occurs in both vacuum (space) and gases</u>

2-compare between thermal conductors and thermal insulators

Thermal conductors	Thermal insulators
<u>They are good heat-conducting substances (high thermal conductivity).</u> <u>Example :</u> • <u>Diamond.</u> • <u>Metals in general, such as:</u> <u>aluminum and copper.</u>	<u>They are poor heat-conducting substances (low thermal conductivity).</u> <u>Example:</u> • <u>Wood.</u> • <u>Plastic.</u>

15

Variant questions

Lesson 4

1. Study then complete

Based on what you have studied, examine the figures in front of you and then answer:

what are the methods of heat transfer shown in the picture?

Figure (1) radiation

Figure (2) conduction



Figure (3) convection

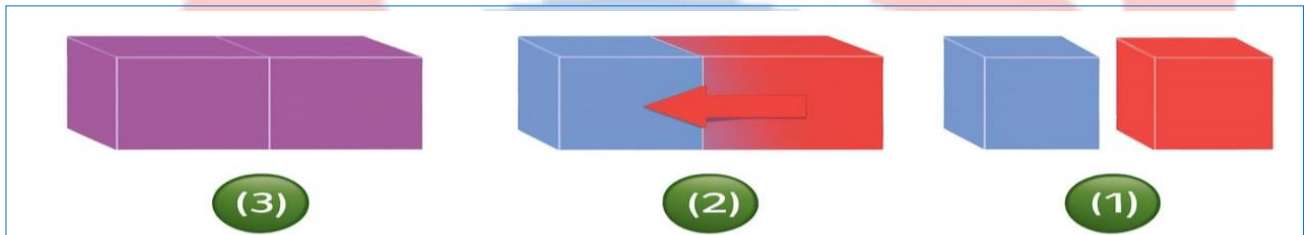
- What is the difference between methods of heat transfer (1) and (3) ?

Radiation: It occurs in both vacuum (space) and gases

while convection It occurs in liquid and gaseous matters (fluids)

2. Study and concentrate :

Explain the following image in light of the concept of thermal equilibrium.



- (1) The two blocks are at the different temperature and not contact together so there is no heat transfer between them.
- (2) The red block is at a higher temperature than the blue block, so heat transfers from the red block to the blue block until they reach thermal equilibrium.
- (3) The two blocks have reached thermal equilibrium, so they are now at the same temperature and no heat transfer occurs between them.

3. Study then answer :In front of you two identical copper cubes touching each other

Figure (1)

- 1- When does thermal equilibrium occur between the two cubes?

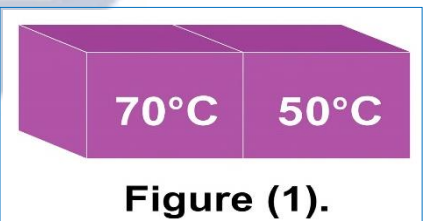


Figure (1).

when both cubes reach the same temperature. Heat will transfer from the hotter cube (70°C) to the cooler cube (50°C) until they both have the same temperature.

- 2- What is the expected temperature of the cubes when thermal equilibrium occurs?

he expected temperature when thermal equilibrium occurs is 60°C

- 3- Draw the direction of heat flow.

Heat flows from the 70°C cube to the 50°C cube (from left to right in the diagram)

Figure (2)

Does heat transfer between the two cubes? Explain your answer.

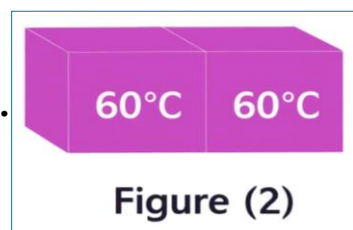
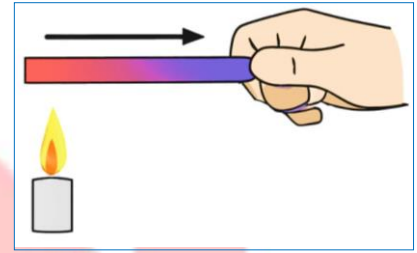


Figure (2)

No, heat does not transfer between the two cubes because they are both at the same temperature (60°C)

4. Observe then determine:

1. Explain why your hand feels the heat of the flame because heat transfers from the hot flame through the metal rod to your hand by conduction.



2. What is the material of the handle you are holding made of?

The handle is made of metal (likely iron, steel, copper, or aluminum)

3. How did the heat transfer in this example?

Heat transferred by conduction through the solid metal rod.

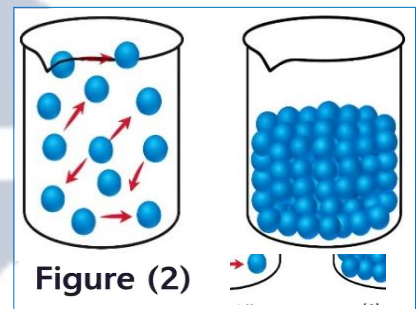
4. What happens when you replace the rod you are holding with a wooden rod?
Explain your answer.

Our hand will feel much less heat from the flame. This is because wood is a poor conductor of heat

5. Observe the following picture well, which shows a substance in two different states in two beakers. Then answer:

1- Which of the two cups has a higher temperature?

Why? Figure (2) has a higher temperature. because the particles are moving faster and are more spread out, which indicates higher kinetic energy



2- What happens when the two cups touch each other?

heat transfers from the hotter cup (Figure 2) to the cooler cup (Figure 1) by conduction through the walls of the cups

6. Study then answer :

Explain how heat is transferred by convection

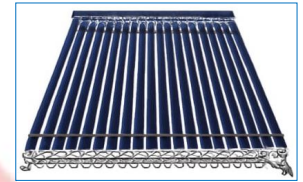
1- When water is heated by a heat source, the water particles at the bottom of the container gain thermal energy and they move faster and further away from each other



- 2- Hot water rises to the top, because it has lower density than cold water Cold water (of higher density) at the surface moves down (sinks) to the bottom to replace the hot water
- 3- The rise of hot water and the moving down of cold water continues

7. Study then answer :

- The figure in front of you for solar heater.



Explain why the pipes of solar heaters are painted black.

because black are excellent absorbers of thermal radiation. and absorbs the maximum amount of heat energy from the sun's rays, converting solar radiation into thermal energy

8. Questions

How does heat transfer in an electric oven? And why?

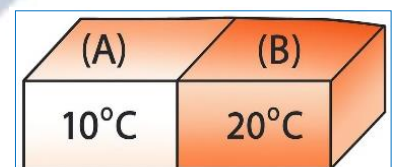


Heat transfers in an electric oven by convection and radiation.

becuase Convection: The heating elements heat the air inside the oven. Hot air rises to the top, while cooler air sinks to the bottom while radiation: The heating elements also emit infrared radiation that travels directly through the air and is absorbed by the food and oven walls

9. From the opposite figure:

- 1- When does the thermal equilibrium occur between the two objects (A) and (B), which are made of the same material and have the same mass?



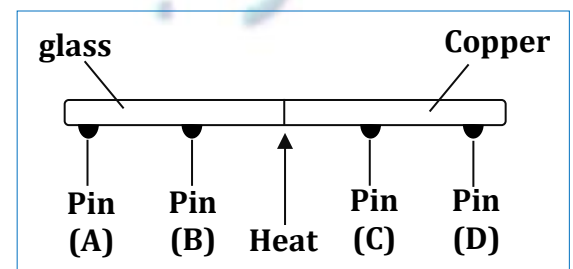
When their temperatures are equal.

- 2- What is the expected temperature of the two objects when thermal equilibrium occurs?

15°C

10. The opposite figure shows four pins fixed Copper Glass with wax in two copper and glass rods that are heated by a single heat source.

Which pin will fall first? Explain your answer.



The pin (C) / Because the thermal conductivity of copper is greater than that of glass, in addition to that the point (C) is closer to the heat source than point (D).

Lesson 1

11. What type of change occurs in each of the following, and what is the reason?



(1) Adding a quantity of vinegar to baking



(2) Moldy bread.



(3) Fireworks



(4) Water with tea leaves added to it.



(5) Adding saffron stigmas to rice

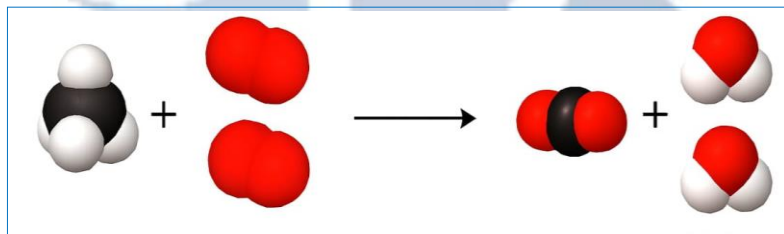


(6) Melting of candle

(1,2,3)chemical change /due to change in composition

(4,5,6)physical change /due to doesn't change in composition

12. Study then answer :



Methethene + Oxygen $\rightarrow$ carbon dioxide + water

-The previous figure illustrates a chemical reaction.

(a) What happened to thereactants? The reactants bonds will break

(b) How were the products formed? the atoms rearranged and make new bond to form new substances.

(c) The chemical reaction is combustion reaction

13. Choose from column (B) the suitable formula from column (A) :-

(A) Element Compound		(B) (Chemical formula or chemical symbol)
1	Silver nitrate (G)	(A) HCl
2	Silver Chloride (L)	(B) CuSO ₄
3	Sodium Chloride (I)	(C) Mg
4	Copper Sulphate (B)	(D) MgO
5	Zinc Sulphate (F)	(E) NaHCO ₃
6	Hydrochloric acid (A)	(F) ZnSO ₄
7	Magnesium (C)	(G) AgNO ₃
8	Copper (K)	(H) NaOH
9	Hydrogen (M)	(I) NaCl
10	Magnesium Chloride (J)	(J) MgCl ₂
11	Magnesium Oxide (D)	(K) Cu
12	Sulphuric acid (N)	(L) AgCl
13	Sodium bicarbonate (Baking soda) (E)	(M) H ₂
14	Sodium hydroxide (Caustic Soda) (H)	(N) H ₂ SO ₄

14. Copper chloride solution reacts with sodium hydroxide solution to form sodium chloride solution and copper hydroxide compound, which is insoluble in water. How can the occurrence of this reaction be indicated, based on what you have studied?

By formation of copper hydroxide precipitate.

15. Compare between the properties of table sugar before and after combustion.

- Before combustion: Sugar is a white solid substance, odourless.
- After combustion: It becomes a black substance has strong odour (caramel) with evolving smoke.

16. What type of change does occur to each of a piece of apple and a piece of ice when left in the air? How can this be indicated?

- A chemical change occurs to the piece of apple indicated by its colour turns brown.
- A physical change occurs to the piece of ice indicated by its melting and turning into water, which can be returned to a solid state once again by cooling.

17. You have the following substances:

- AgCl • NaCl • AgNO₃ • NaNO₃

Identify the reactants and products from these substances.

- Reactants : AgNO₃ , NaCl
- Products: AgCl, NaNO₃

18. NaOH solution is added to each of copper sulphate solution and iron sulphato solution, separately.

How can they be distinguished despite the formation of a precipitate in both cases?

The difference in the colour of the formed precipitate in both cases.

19. Apply the concept of chemical reaction to the reaction of producing ammonia gas NH₃ from nitrogen gas N₂ and hydrogen gas H₂

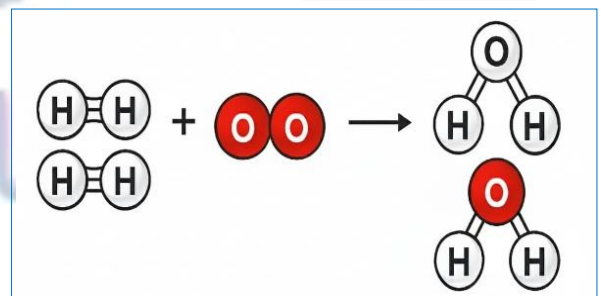
The breaking of bonds between the atoms of the molecules of each of N₂, H₂ (the reactants) and the formation of new bonds between the atoms of the molecules of NH₃ (the product).

Lesson 2

20. The following figure illustrates a chemical reaction.

(a) Write the reaction equation $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

(b) Write the physical state of the reactants and products $2\text{H}_{2(g)} + \text{O}_{2(g)} \rightarrow 2\text{H}_{2\text{O}(l)}$



Find:

(c) The sum of the number of molecules of the reactants and products.

Reactants: 2 molecules of H₂ + 1 molecule of O₂ = 3 molecules

Products: 2 molecules of H₂O = 2 molecules

Total = 5 molecules

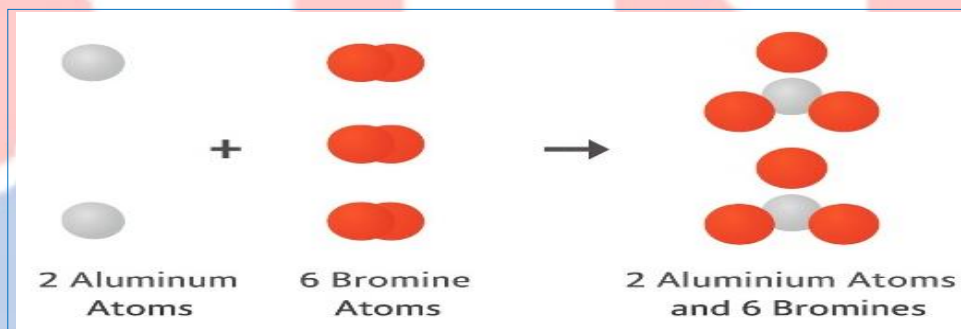
(d) The sum of the number of atoms of the reactants and products.

Reactants: $(2 \times 2 \text{ hydrogen atoms}) + (1 \times 2 \text{ oxygen atoms}) = 4 + 2 = 6 \text{ atoms}$

Products: $2 \times (2 \text{ hydrogen atoms} + 1 \text{ oxygen atom}) = 2 \times 3 = 6 \text{ atoms}$

Total = 12 atoms

21. The figure illustrates a chemical reaction.



-Write the balanced reaction equation $2\text{Al} + 3\text{Br}_2 \rightarrow 2\text{AlBr}_3$

22. Choose from column (B) the suitable for column (A)

(A) Physical State or Meaning Symbol	(B) Symbol
1 Using a concentrated acid (F)	(A) S
2 Vapor (D)	(B) L
3 Using a catalyst (H)	(C) G
4 Aqueous solution (substance dissolved in water) (E)	(D) V
5 Gas (C)	(E) aq
6 Heating (Heat) (I)	(F) conc
7 Solid or precipitate (A)	(G) dil
8 Liquid (B)	(H) cat
9 Using a dilute acid (G)	(I) Δ

23. What happens when: A calcium chloride solution is added to a sodium sulphate solution?

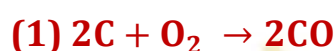
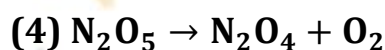
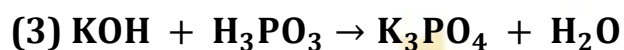
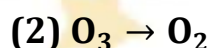
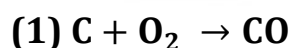
Explain your answer with a balanced equation.

occurrence of a chemical reaction accompanied by the formation of calcium sulphate precipitate. $\text{CaCl}_{2(\text{aq})} + \text{Na}_2\text{SO}_{4(\text{aq})} \rightarrow \text{CaSO}_{4(\text{s})} + 2\text{NaCl}_{(\text{aq})}$

24. Choose from column (B) the suitable for column (A)

(A) The compound		(B) Chemical formula or symbol
1	Sodium nitrate Ⓓ	Ⓐ HI
2	Hydrogen iodide Ⓐ	Ⓑ FeSO_4
3	Iron sulphate Ⓑ	Ⓒ NH_3
4	Ammonia Ⓒ	Ⓓ NaNO_3

25. Balance the following symbolic equations:

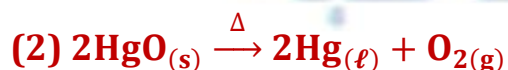


26. Write the balanced symbolic equations expressing the following reactions, including the physical state of the substances and the reaction conditions:

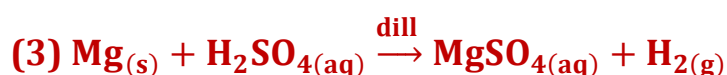
1- Combustion of ethane gas C_2H_6 in oxygen to form condensed water vapour and carbon dioxide.



2- Heating mercury oxide powder HgO strongly to form mercury and oxygen gas.



3- Reaction of magnesium with dilute sulphuric acid to form magnesium sulphate salt dissolved in water and hydrogen gas bubbles.



حمل الآن

مجاناً وحصرياً

المراجعة رقم (4)

اختبار شهر نوفمبر



Lesson (4)

Methods of heat transfer

Heat

- Energy that is transferred from one system to another or to the surrounding, due to a difference in temperature.

Notes:-

- Heat flow means the movement of thermal energy from a hot object to cold one .
- **Give reason:** A pot of boiling water (100°C) in a room (25°C) the water cools down ?
Because heat moves from the hot water to cooler room.

❖ Practical Activity (How heat flows ?)

Steps	Observations
1-Measure the temperature of cold water (20°C)	Water temperature increases $20^{\circ}\text{C} \longrightarrow 28^{\circ}\text{C}$
2-Heat some metal balls in boiling water until they reach (100°C)	Metal balls temperature decreases: $100^{\circ}\text{C} \longrightarrow 28^{\circ}\text{C}$
3-Put the hot balls into the cold water and measure the new temperature	Final temperature (equilibrium) = 28°C

Notes :

- Water heats up slowly.
- Metal balls cool down quickly.
- **Reason:** the specific heat of water is greater than the specific heat of metal.

❖ Thermal Equilibrium :-

- When two objects at different temperatures come into contact:
 - Heat flows from the hot object to the cold object.
 - Flow continues until both reach the same temperature.

Thermal Equilibrium

- Is the state when two systems in contact reach to the same temperature.

➤ Important :

- Heat lost by the hot body = heat gained by the cold body

➤ Examples :

- 1-Object (50 °C + object (30 °C) —————> both reach (40°C)
- 2- Object (30 °C)+ Object (30 °C)—————> No heat transfer .
- 3-Cup of Nescafe (70°C) + Milk (20 °C)—————> The final temperature is between 70 °C and 20 °C

+ Notes :-

- Heat transfer stops when thermal equilibrium is reached.
- The rate of change depends on the specific heat capacity of the material, differ in mass and type.

Don't forget

Specific heat capacity:

The amount of heat energy required to raise the temperature of (1 Kg) of a substance by 1°C

- This means that each material has a different ability to retain or absorb heat . this ability called specific heat capacity .



Methods of heat transfer

Conduction

Convection

Radiation

❖ First : Heat transfers by conduction :-

Conduction

- Heat is transferred through **solids** from the hot side to the cold side.

➤ How it works :

Metal rod is **heated**

The particles (atoms) **gain kinetic energy**

Particles **vibrate faster** and collide with neighbors particles

These neighbors **gain energy** and pass it on to the next ones

Heat moves without particles leaving their position.

Thermal conductivity

- A measure of the extent to which a material conducts heat trough it.**

➤ Classification of materials :

P.O.C	Thermally conductive materials	Thermally insulating material
Definition	Good thermal conductors have high thermal conductivity	Poor thermal conductors have low thermal conductivity
Examples	Diamonds – All Metals	Wood – plastic- cardboard



✓ What happen if :

✓ Two rods (copper and iron) with wax and pins are heated ?

Pins on copper fall faster, because copper conducts heat better than iron

✓ Give reason:

✓ 1-Pizza is placed in cardboard boxes.

To keep it hot, because cardboard is a heat-insulating material.

2-The presence of cooling systems inside electronic devices such as computers and smartphones that use materials that conduct heat well such as silver ?

To get rid of heat generated in the internal components, which may lead to poor performance and possibly damage.

❖ Second : Heat transfer by convection :-

Convection

- It is the transfer of heat in liquids and gases by the movement of their particles.

How it works (in water)?

1. When water near the bottom is heated, particles gain energy.

↓
move faster

↓
become less dense.

2. Hot water rises up.

3. Cold water (more dense) moves down to take its place.

4. This continuous movement forms convection currents.

How it works (in air)

- 1-When air is **heated**, its density **decreases** → **rises** (moves up) .
- 2-When air is **cooled**, its density **increases** → **sinks** (moves down) .

Examples

1. **Heater at floor of room:** Warm air rises, cold air sinks.
2. **Freezer at top of refrigerator:** Cold air sinks, warm air rises.
3. **Sea Breeze:**
 - During the day, land heats faster than sea.
 - Warm air above land rises, replaced by cold air from sea.



Sea Breeze

The movement of cold air (breeze) from the sea during the day towards the land.

✓ Give reason:

The reason for sea Breeze occurrence.

The specific heat of land is lower than the specific heat of sea water.

✚ Note :

- The effect of the sea Breeze phenomenon is **more** evident in the **summer** than in the **spring or autumn**



How can an eagle fly in the air at great heights?

The air near the Earth's surface is heated by the sun.



The warm air becomes lighter (less dense) and rises upwards.

The eagle spreads its wide wings to rise with the warm air currents without flapping its wings.

The upward force of warm air balances the force of gravity,
So the eagle can stay high in the sky easily

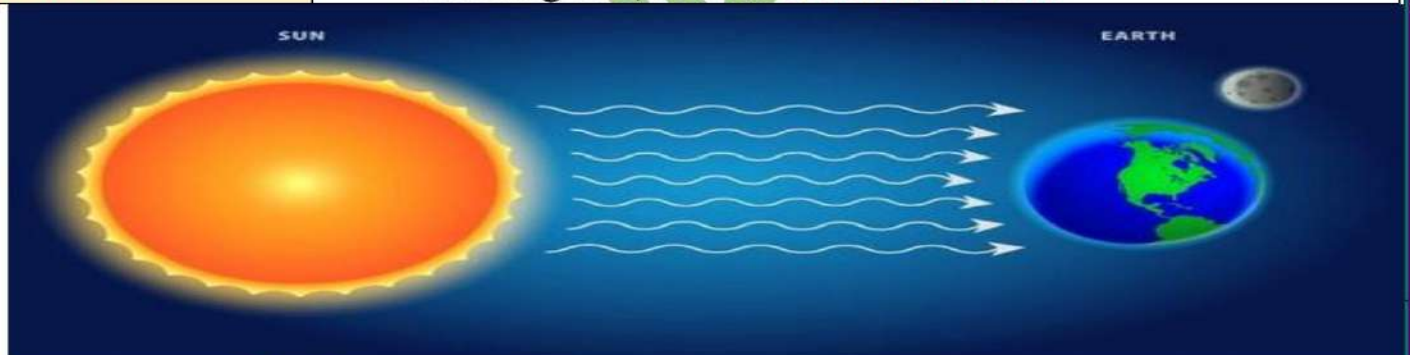
☀ Third : Heat Transfer by Radiation:-

Radiation

- It is the transfer of heat energy in the form of electromagnetic waves (such as light and infrared) **without the need of particles or a medium.**
- Heat is transmitted by radiation in a **vacuum** and in **gases**

Electromagnetic waves

- Waves that propagate in a vacuum at a very high speed, reaching 300,000 m/s **in all directions**



✚ Notes :-

- Heat from the sun reaches Earth by **radiation through space.**
- **All hot objects radiate heat (infrared rays).**
- **The hotter the object, the more infrared radiation it emits.**
- **Solar radiation consists of many electromagnetic waves.**





Examples & Applications:

1. Heat transfer from a lamp to the hand.
2. Solar water heaters are painted black to absorb radiation.
3. Clothes:

In the Summer	In the Winter
Wear white / light clothes (reflect radiation).	Wear dark clothes (absorb radiation).

4. Firefighters wear shiny uniforms to reflect heat.

Thermal radiation	The transmission of infrared rays from the surfaces of objects, especially hot ones, without the need for material particles.
--------------------------	---

Thermography	- A technology using special cameras to detect thermal radiation and convert it into colored images. ➤ The thermograph camera is used : 1-Photography in dark. 2- Detecting body temperature 
---------------------	--

□ Biology Integration

✓ Snakes can hunt prey at night ? (G.R)

Because sensors in their heads detect infrared radiation from warm bodies.



Worksheet (4)

Q.1) Write the scientific term :-

- 1) The energy that transfer from one system to another as a result of the difference in their temperature. (.....)
- 2) The state in which 2 different systems differ in their temperature and touching each other where their temperature becomes equals. (.....)
- 3) A Technique in which a camera use the sense of thermal waves emitted from bodies and change it into colored photos. (.....)

Q.2) What is meant by:

(1) Heat:

.....

(2) Thermal equilibrium

.....

(3) Sea breeze

.....

.

Q.3) Give reason :-

1-It is preferable to place an electric heater on the floor of a room.

.....

2- The sun's heat is transmitted to us by radiation.

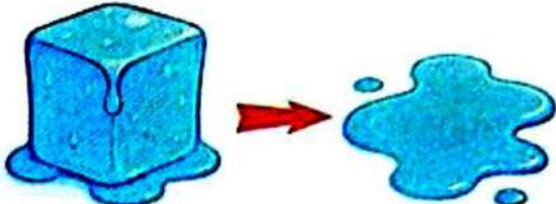
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UNIT (2)



Lesson (1): Chemical Reactions

Physical Changes	Chemical Changes
It is a change in the state or shape of matter without changing its chemical composition.	It is the change that results in new substances with different chemical properties from the original materials.
- Melting of ice - Dissolving sugar in water - Dissolving salt in water - Melting of wax. - Cutting paper 	- Burning of wood - Rusting of an iron nail. - Milk turning into yogurt - Burning of wax. - Burning a piece of bread in the oven. - Clouding of clear limewater when carbon dioxide gas is passed through it 

Give reason:

-Clouding of clear limewater when carbon dioxide gas is passed through it is considered chemical change.

→ Due to the chemical reaction and the formation of a new substance that insoluble in water .

- Change in the color of a moistened universal indicator strip when exposed to ammonia gas is considered chemical reaction.

→ Due to the chemical reaction and the formation of a new substance that has different color.



CONCEPT OF CHEMICAL REACTIONS :

Activity (1) :

Materials and Tools Used:

Baking soda (sodium bicarbonate) - Vinegar (diluted acetic acid) – Balloon - Funnel - Empty bottle

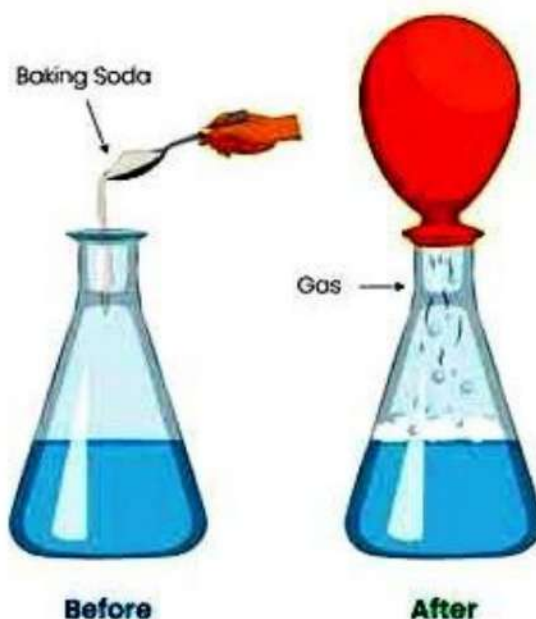


Steps	Observation	Explanation
1- Put two spoons of baking soda into the balloon.	Effervescence occurs and gas bubbles rise, causing the balloon to expand and fill with gas	The chemical reaction between baking soda (sodium bicarbonate) and vinegar (diluted acetic acid) results in effervescence and the release of carbon dioxide gas.
2- Pour some vinegar into the bottle.		
3- Insert the balloon's mouth into the bottle's mouth.		
4- Lift the balloon to pour the baking soda into the bottle.		

Without Baking Soda



With Baking Soda



Mechanism of chemical reactions

➤ Chemical Reaction

A process that involves the transformation of:



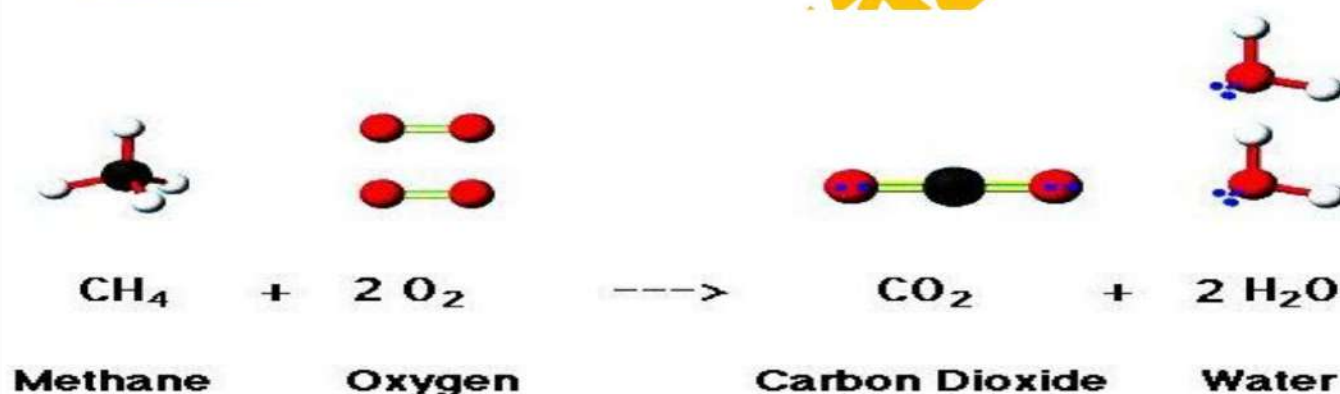
In a chemical reaction, the reactants combine, decompose or are replaced by new reactants to form new products.

Step 1:

Breaking the bonds between atoms in the molecules of the reactants.

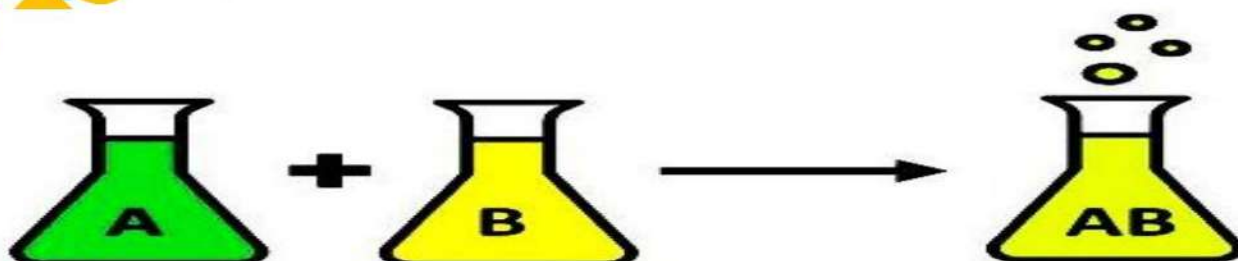
Step 2:

Rearranging the atoms and forming new bonds to create the products.



Combustion Reaction

➤ **Chemical reaction:-** It is the process of breaking the bonds between atoms in the molecules of the reactants and formation of new bonds between atoms in the molecules of the products.



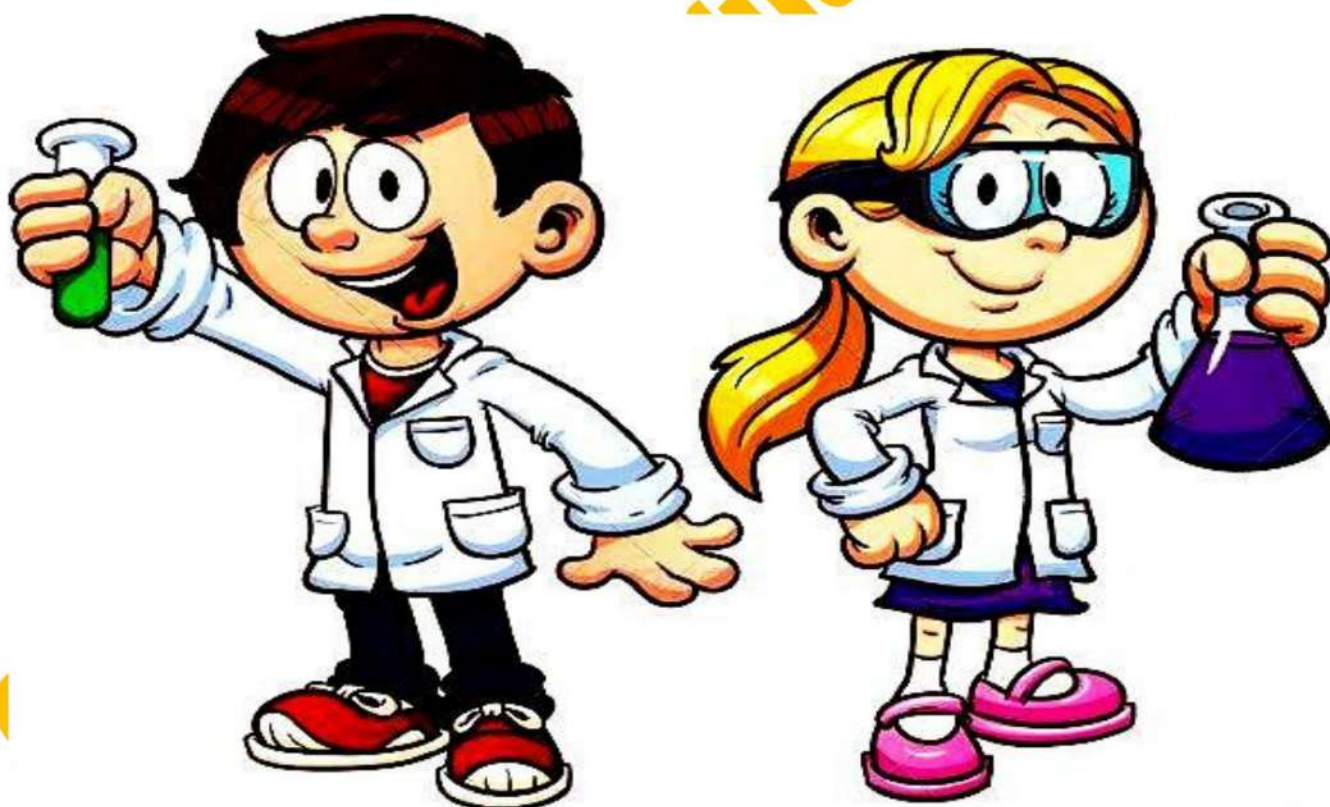
indicators of the occurrence of a chemical reaction

Formation of a precipitate

Colour change

Evolution of gas

Emission of light and heat



Indicators	Chemical Reaction	Evidence of chemical reaction
1-Formation of a precipitate	Adding silver nitrate solution (AgNO_3) to sodium chloride solution (NaCl) 	A white precipitate of <u>silver chloride (AgCl)</u> forms, which is insoluble in water and settles at the bottom of the container. 
2. Gas Evolution	Adding diluted hydrochloric acid (HCl) to a strip of magnesium (Mg) 	Bubbles of <u>hydrogen gas</u> are formed 
3.Change in color of the substance	Placing a zinc plate (Zn) in copper (II) sulfate solution (CuSO_4) 	→ The <u>blue color</u> of the copper sulphate solution <u>disappears</u> , forming a <u>colorless zinc sulphate solution</u> , and <u>red copper precipitates</u> on the zinc plate. 
4.Emission of light and heat	Burn a strip of magnesium (Mg) in atmospheric air 	<u>Mg strip turns into magnesium oxide (MgO) white powder</u> , which is soluble in water. 

➤ What indicates a chemical reaction when baking soda reacts with a diluted acid like H_2SO_4 ?

➡ Emission of carbon dioxide gas bubbles



- What indicates a chemical reaction when sodium hydroxide (NaOH) solution reacts with copper chloride (CuCl_2) solution?

→ A blue precipitate of copper hydroxide is formed that is insoluble in water.



- What indicates a chemical reaction when an orange goes rotten ?

→ The color changes to dark greenish and a bad smell is released.



- How can you distinguish between copper sulfate and ferrous sulphate when adding sodium hydroxide separately?

→ Precipitate difference: a blue precipitate of copper hydroxide and a green precipitate of iron (II) hydroxide are formed.

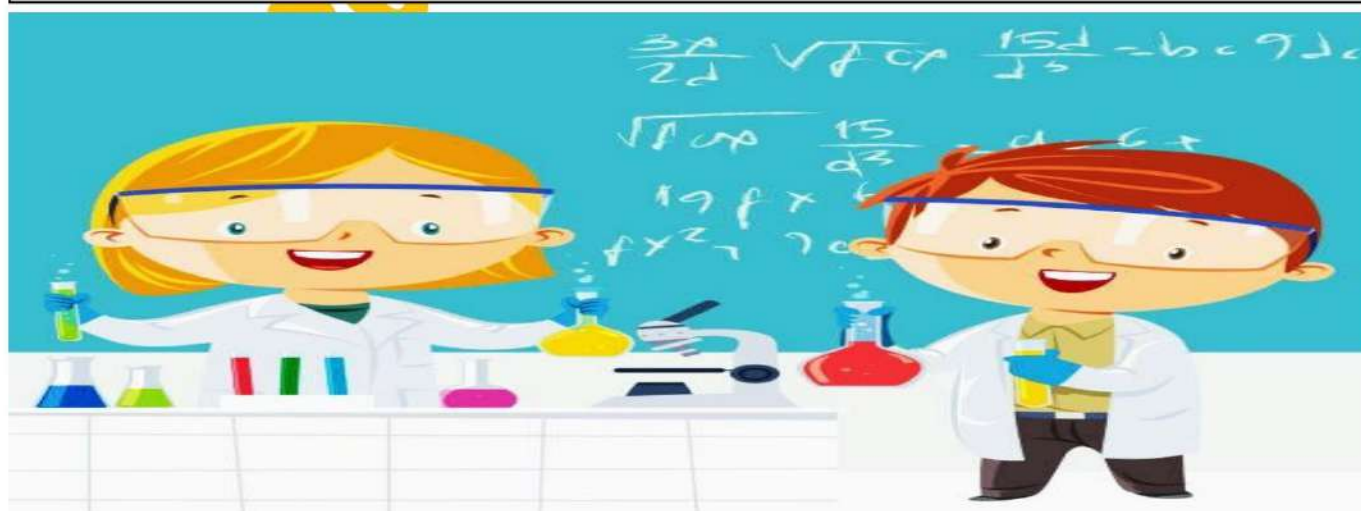


Do the following change indicate a chemical reaction? How can this be

- A glass bottle filled to the brim with water and tightly closed is broken when placed in the freezer of the fridge.



No, because the expansion of water during freezing does not result in a change in the chemical composition of the water or the glass.



NOTE: When a reaction occurs , it leads to the formation of :
precipitate, a change in color, the release of a gas, the emission of light and heat, the extinguishing of a burning match stick, or the increase in the glow of a burning splinter.

Laboratory safety precautions :

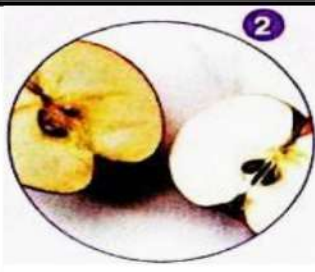
1. Wearing a protective mask.
→ To avoid the harmful effect of bright light.
2. Do not touch the white powder formed after burning magnesium ribbon.
→ Because it will be hot.
3. Hold the magnesium strip with heat-resistant tongs.
→ To avoid burns during burning.
4. Handle acids carefully with extreme caution,, especially concentrated acids.
→ Because they are very dangerous.

Chemical reaction in life

1- When eggs are fried, a chemical reaction occurs, causing a change in the colour and texture of both white and yellow parts.



2. Reaction of oxygen in the air with apple slices causing the apple to turn brown.



3. Rusting of Iron when exposed to oxygen in moist air.



4. Fireworks reaction causes the emission of light and heat.



Evidence of a chemical reaction



The Properties of substances before and after chemical

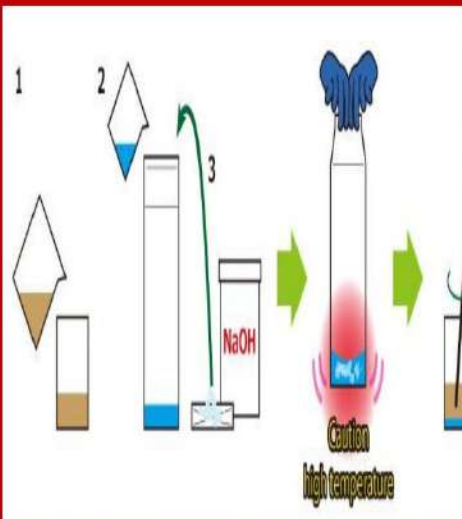
➤ ACTIVITY 1: BURNING SUGAR

Steps	Observation	conclusion
1. Put a quantity of table sugar in a spoon.	-The sugar turns into a brown molten color and begins to burn.	When molten sugar burns, a chemical reaction occurs, indicated by:
2. Slowly heat the sugar by placing the spoon over the flame.	-A strong odor similar to (the smell of caramel) appears	-The appearance of a strong odor (the smell of caramel) - The color changes -The smoke rises -The formation of a new substance (<u>carbon</u>)

	Properties of substances before the reaction	Properties of substances after the reaction
Color	-White - solid 	Black substance 
Odor	-Odorless	-Strong odor and smoke

ACTIVITY (2) : THE REACTION OF OIL WITH CAUSTIC SODA

Tools: Oil - Glass beaker - Caustic soda solution (sodium hydroxide) - Flame - Stirring rod

Steps	Observation	Conclusion
1-Place 100 ml of vegetable oil in a glass beaker with a capacity of 250 ml. 2-Add 30 ml of caustic soda solution (sodium hydroxide) to the oil drop by drop. 3-Heat the mixture using a suitable heat source of 40-50 C while stirring the ingredients well together in one direction. 4-Observe the changes that occur and record them.	- The consistency of the mixture change. - A new substance is Formed 	Adding oil to the caustic soda solution while heating leads to a chemical reaction, indicated by a change in consistency and a new substance (soap) is formed. 

The texture of the substance changes before and after the reaction, as shown in the following table.

	<u>Properties of substances before the</u>	<u>Properties of substances</u>
	<u>..</u>	<u>after the reaction</u>
State	Oil: Liquid Concentrated sodium hydroxide solution	Soap: Solid

WORKSHEET (1)



Give reason :

1-Melting ice is considered a physical change.

.....

.....

2-Burning wood is considered a chemical change.

.....

.....

3- Adding drops of food coloring to a glass of water not considered a chemical reaction, even though the water changes color

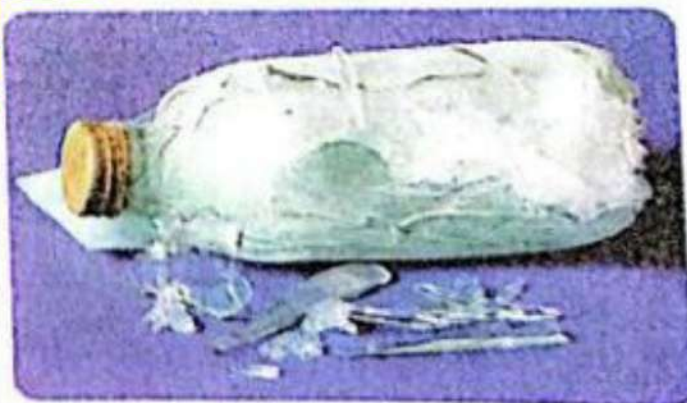
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➤ Do the following changes indicate a chemical reaction? Why?

.....

.....



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المراجعة رقم (5)

اختبار شهر نوفمبر



Question1: Write the balanced symbolic chemical equations that express the following reactions, with the physical state of the reactants and products:

- 1- Reaction of magnesium metal with dilute hydrochloric acid.
- 2- Combustion of ethane gas (C_2H_6) in an abundance of oxygen gas, with the reaction condition.
- 3- Heating mercury (II) oxide powder strongly to form mercury and oxygen.
- 4- Reaction of magnesium with dilute sulfuric acid to form magnesium sulfate soluble in water and hydrogen gas.
- 5- Reaction of solid iodine with hydrogen gas to form hydrogen iodide gas.
- 6- Reaction of nitrogen gas with hydrogen gas to form ammonia gas.

Question2: What is meant by

- 1-System
- 2-closed system
- 3- Isolated system
- 4- Open system
- 5- Internal Energy of the system
- 6-Temperature of the system
- 7-Specific Heat
- 8-Heat
- 9- Thermal equilibrium
- 10-Thermal conduction
- 11- Thermal conductivity
- 12- Thermally conductive materials
- 13-Thermally insulating Materials
- 14-Sea breeze



- 15- Chemical change.
- 16- Physical change.
- 17- Chemical equation
- 18- Balanced chemical equation
- 19-Catalysts
- 20-Law of Conservation of Mass
- 21- Subscripts
- 22-chemical reaction

Question3: Give scientific reason for each of the following:

- 1- When a zinc plate is placed in a beaker containing a blue copper sulphate solution, the blue color disappears.
- 2- A magnesium strip must be held with a tongs before lighting it with a flame.
- 3-There are cooling systems inside computers that use materials with good thermal conductivity, such as silver.
- 5-A heater is placed on the floor of a room.
- 6-The sun's heat reaches us by radiation.
- 7-The burning of wood is a chemical change, while the melting of ice is a physical change.
- 8-When burning a magnesium ribbon, it is a must to wear a protective mask.
- 9-Increasing temperature of a substance increases by decreasing its mass when it gains the same amount of thermal energy.
- 10-When heating two equal quantities of water and oil for the same period of time and from the same heat source, the increase in the oil's temperature is than that of water.
- 11- It is preferable to make cooking utensils from copper instead of aluminum.
- 12- Mercury is used in the manufacture of thermometers.



- 13- Water is the main component of the human body.
- 14- When a quantity of iron balls at 80°C is mixed with a quantity of water at 30°C , the temperature of the mixture at equilibrium is not 55°C .
- 15- Snakes are able to hunt their prey at night.
- 16- Cooking utensils are made of metal while their handles are made of wood or plastic.
- 17- Polystyrene boards are preferred for use between hollow bricks when constructing building walls.
- 18- An eagle soars at high altitudes without flapping its wings.
- 19- The sea breeze phenomenon occurs.
- 20- Heat transfers from the sun to the earth despite the great distance between them.
- 21- Heat transfers from a hot body to a cold body.
- 22- The refrigerator freezer is placed at the top of the refrigerator.

Question 4: What do you observe when...?

- 1- Burning table sugar.
- 2- Heating a mixture of caustic soda and oil with continuous stirring.
- 3- Slices of apple or potato are left exposed to the open air.

Question 5: How do you infer that a chemical reaction has occurred in the following experiments?

- 1- Frying an egg.
- 2- Igniting fireworks.
- 3- Adding a piece of a magnesium strip to a test tube containing dilute hydrochloric acid



Question6: Write the chemical formula for the following compounds:

- 1- Silver nitrate
- 2- Sodium chloride
- 3- Silver chloride
- 4- Sodium nitrate
- 5- Hydrochloric acid
- 6- Copper sulphate
- 7- Zinc sulphate
- 8- Magnesium oxide
- 9- Copper chloride
- 10- Sodium hydroxide

Question 7: Compare between each of the following in terms of definition and examples:

- 1- Open systems, closed systems, and isolated systems.
- 2- Thermally conductive materials and thermally insulating materials.
- 3- Physical change and chemical change.
- 4- Convection and Radiation.

Question8: Complete

1. Heat transfers in three different ways:,.....and
2. Energy transfers from a system with atemperature to a system with a temperature
3. The sun's heat reaches us by.....while a heater's heat reaches us by.....
And.....
4. A.....camera can sense the.....radiation emitted by objects and convert it into color images.



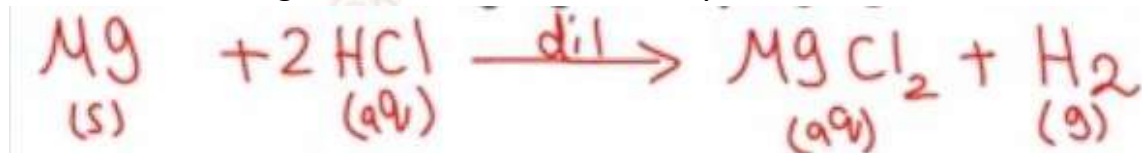
Question9: Variant Questions

- 1- How does heat transfer in an electric oven? And why?
- 2-What are the factors that affect the temperature of a body (system)?
- 3-What are the steps of a chemical reaction?
- 4-What are the laboratory safety precautions when burning a magnesium ribbon?
- 5- Mention examples of some chemical reactions that occur in daily life.

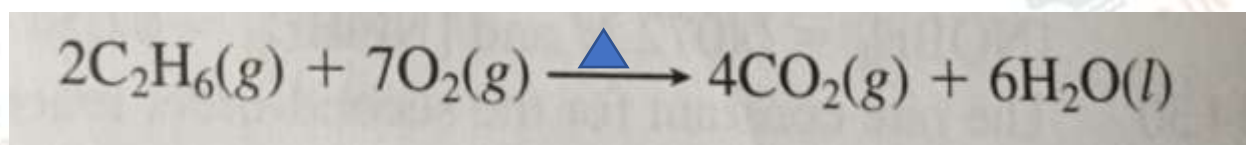


Question1: Write the balanced symbolic chemical equations that express the following reactions, with the physical state of the reactants and products:

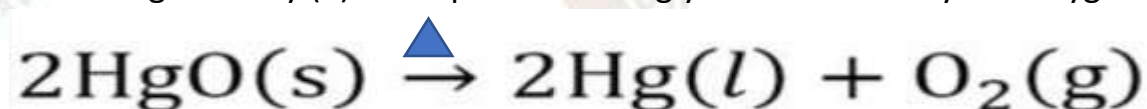
1- Reaction of magnesium metal with dilute hydrochloric acid.



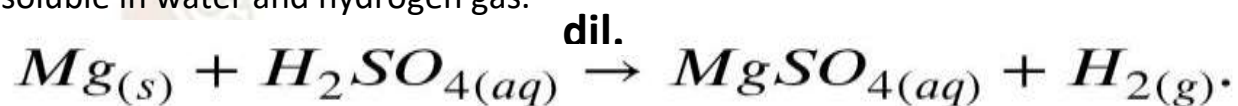
2- Combustion of ethane gas (C₂H₆) in an abundance of oxygen gas, with the reaction condition.



3- Heating mercury (II) oxide powder strongly to form mercury and oxygen.



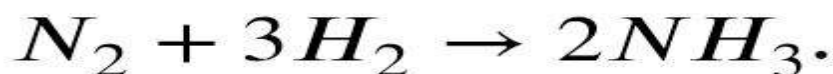
4- Reaction of magnesium with dilute sulfuric acid to form magnesium sulfate soluble in water and hydrogen gas.



5- Reaction of solid iodine with hydrogen gas to form hydrogen iodide gas.



6- Reaction of nitrogen gas with hydrogen gas to form ammonia gas.



Question2: What is meant by

1-System

Any part of universe that is under study where change of matter and energy is observed

2-closed system

A system in which there is an exchange of energy without matter with the surrounding environment.

3- Isolated system

A system in which there is no exchange of matter and energy with the surrounding environment.

4- Open system

A system in which there is an exchange of matter and energy with the surrounding environment.

5- Internal Energy of the system

Sum of potential and kinetic energies of system particles

6-Temperature of the system

Measure the average kinetic energy of particles

7-Specific Heat

The amount of heat required to raise the temperature of 1 kilogram of matter by 1 °C.

8-Heat

The energy that is transferred from the system to another or to the surroundings due to the difference in their temperature

9- Thermal equilibrium

The state reached by two systems with different temperatures after they come into contact and their temperatures become equal.



10-Thermal conduction

The transfer of thermal energy through solid materials from one point to another without the movement of the particles from their positions.

11- Thermal conductivity

Measure the ability of substance to conduct heat

12- Thermally conductive materials

Materials that are good conductors of heat.

13-Thermally insulating Materials

Materials that are poor conductors of heat.

14-Sea breeze

Cool air blowing from sea to land during daytime

15- Chemical change.

is a change that results in new substances with different chemical properties from those of the original substances

16- Physical change.

is a change in the state or shape of a substance without changing its chemical composition

17- Chemical equation

Symbolic representation of the reactants and products using symbols and chemical formulas showing the simplest ratio between the number of atoms of elements or molecules entering and resulting from the reaction

18- Balanced chemical equation

A symbolic chemical equation in which the number of atom of each element of the reactants is equal to the number of atoms of the same element in products

19-Catalysts

A substance that increase the speed of chemical reaction without being changed



20-Law of Conservation of Mass

Total mass of substances involved in the chemical reaction equal to the total mass of products

21- Subscripts

Number below the symbols of elements represents number of atoms in a single molecule

22-chemical reaction

is the process of breaking the bonds between atoms of the reacting substances (reactants) and forming new bonds between atoms of the produced substances (products).

Question3: Give scientific reason for each of the following:

1- When a zinc plate is placed in a beaker containing a blue copper sulphate solution, the blue color disappears.

The blue color of the copper sulfate solution disappears, forming a colorless zinc sulfate solution ZnSO_4 , and reddish brown copper is deposited on the zinc plate.

2- A magnesium strip must be held with a tongs before lighting it with a flame.
to avoid burns during heating.

3-There are cooling systems inside computers that use materials with good thermal conductivity, such as silver.

To get rid of the heat generated by internal components, which reduce their performance or cause damage.

5-A heater is placed on the floor of a room.

To ensure heat distribution throughout the room. as when the air around the space heater is heated, its density decreases and rise upward and the cold air replace the warm air

6-The sun's heat reaches us by radiation.

Because it travels through space without need of particles as electromagnetic waves



7-The burning of wood is a chemical change, while the melting of ice is a physical change.

Because the burning of wood results in new substances with different chemical properties from those of the original substances

While melting of ice is a change in the state and shape only without changing its chemical composition

8-When burning a magnesium ribbon, it is a must to wear a protective mask.

To avoid any burns or damage

9-Increasing temperature of a substance increases by decreasing its mass when it gains the same amount of thermal energy.

Because the thermal energy distributed over few number of particles

10-When heating two equal quantities of water and oil for the same period of time and from the same heat source, the increase in the oil's temperature is than that of water.

Because the specific heat of oil less than the specific heat of water

11- It is preferable to make cooking utensils from copper instead of aluminum.

Because copper has less specific heat than aluminum

12- Mercury is used in the manufacture of thermometers.

Mercury has low specific heat so its temperature increases by absorbing any amount of heat

13- Water is the main component of the human body.

Because it has high specific heat so it keeps body temperature constant

14- When a quantity of iron balls at 80°C is mixed with a quantity of water at 30°C , the temperature of the mixture at equilibrium is not 55°C .

Because they are different substances with different specific heat



15- Snakes are able to hunt their prey at night.

Because they sense the infrared rays from preys body due to sensory receptors at the front of their head

16-Cooking utensils are made of metal while their handles are made of wood or plastic.

Cooking utensils are made of metals because they are thermal conductors
their handles are made of plastic or wood because they are thermal insulators

17-Polystyrene boards are preferred for use between hollow bricks when constructing building walls.

Because polystyrene and air are thermal insulators which prevents rapid changes in temperature inside the buildings when the outside temperature changes, this reduces the cost of air conditioning

18- An eagle soars at high altitudes without flapping its wings.

The warm air near the Earth's surface has low density creating upward convection currents.

This upward force equals the force of gravity, allowing the eagle to remain floating in the air

19- The sea breeze phenomenon occurs.

Because the specific heat of land less than that of water, so the air in contact with land becomes hotter, and rises upward and is replaced by cool air (breeze) from the sea direction.

20- Heat transfers from the sun to the earth despite the great distance between them.

Because the Sun's heat transfers to us by radiation without the need for material particles.

21- Heat transfers from a hot body to a cold body.

Due to the difference in temperature



22- The refrigerator freezer is placed at the top of the refrigerator.

To ensure distribution of heat throughout the refrigerators the colder air (higher density) sinks downward, and the warmer air (lower density) rises upward.

Question4: What do you observe when...?

1- Burning table sugar.

During the burning process:

- a) Sugar gradually turns into a brown molten liquid.
- b) strong odour appears (caramel smell)

After complete combustion:

- a) evolving of Smoke.
- b) The Color changes.
- c) a solid black substance (carbon) remains

2- Heating a mixture of caustic soda and oil with continuous stirring.

The texture changes over time, and the mixture transforms into a new solid Substance (soap)

3- Slices of apple or potato are left exposed to the open air.

a chemical reaction occurs with the atmospheric oxygen, causing the apple or the potato to turn brown

Question5: How do you infer that a chemical reaction has occurred in the following experiments?

1- Frying an egg.

change in the color and texture of both white and yellow parts.

2- Igniting fireworks.

a chemical reaction occurs, accompanied by the emission of light and heat.

3- Adding a piece of a magnesium strip to a test tube containing dilute hydrochloric acid

Bubbles of hydrogen gas are formed



Question6: Write the chemical formula for the following compounds:

- 1- Silver nitrate AgNO_3
- 2- Sodium chloride NaCl
- 3- Silver chloride AgCl
- 4- Sodium nitrate NaNO_3
- 5- Hydrochloric acid HCl
- 6- Copper sulphate CuSO_4
- 7- Zinc sulphate ZnSO_4
- 8- Magnesium oxide MgO
- 9- Copper chloride CuCl_2
- 10- Sodium hydroxide NaOH

Question7: Compare between each of the following in terms of definition and examples:

1- Open systems, closed systems, and isolated systems.

closed system

A system in which there is an exchange of energy without matter with the surrounding environment.

Such as thermometer

Isolated system

A system in which there is no exchange of matter and energy with the surrounding environment.

Such as thermos

Open system

A system in which there is an exchange of matter and energy with the surrounding environment.

Such as uncovered cup of tea



2- Thermally conductive materials and thermally insulating materials.

Thermally conductive materials

Materials that allow heat to flow through , have high thermal conductivity

Such as diamond , silver

Thermally insulating Materials

Materials that don't allow heat to flow through , have low thermal conductivity

Such as wood , plastic

3- Physical change and chemical change.

Chemical change.

is a change that results in new substances with different chemical properties from those of the original substances

such as burning of wood

Physical change.

is a change in the state or shape of a substance without changing its chemical composition

such as melting of ice



4- Convection and Radiation.

Thermal convection	Thermal radiation
The transfer of thermal energy through fluids with the movement of their particles	The transfer of thermal energy from the surfaces of hot objects without the need for material particles
Heat transfers upwards (from the region of least density in the fluid to the region of greatest density)	Heat transfers in all directions
It occurs in liquid and gaseous matter (fluids)	It occurs in both vacuum (space) and gases
The space heater is placed on the floor of the room as the heat is transferred from the space heater to the air around it, causing the warm air to rise and the cold air to sink to replace the warm air and thus the heat is distributed throughout the room.	Thermography uses a camera to detect the thermal radiation emitted by objects and converts it into colored images. The colors depend on variations in the object's temperature. uses of Thermography :Imaging in darkness & Detecting the temperature of objects.

Question8: Complete

1. Heat transfers in three different ways: **Conduction**, **Convection** and **Radiation**.
2. Energy transfers from a system with a **high** temperature to a system with a **low** temperature.
3. The sun's heat reaches us by **radiation** while a heater's heat reaches us by **radiation** and **convection**
4. A **Thermographic** camera can sense the **infrared** radiation emitted by objects and convert it into color images.

Question9: Variant Questions

1- How does heat transfer in an electric oven? And why?

By conduction: from hot metal of oven to the metallic utensils and food

By convection: by heating air inside the oven

By radiation: infrared radiation emitted from hot bodies



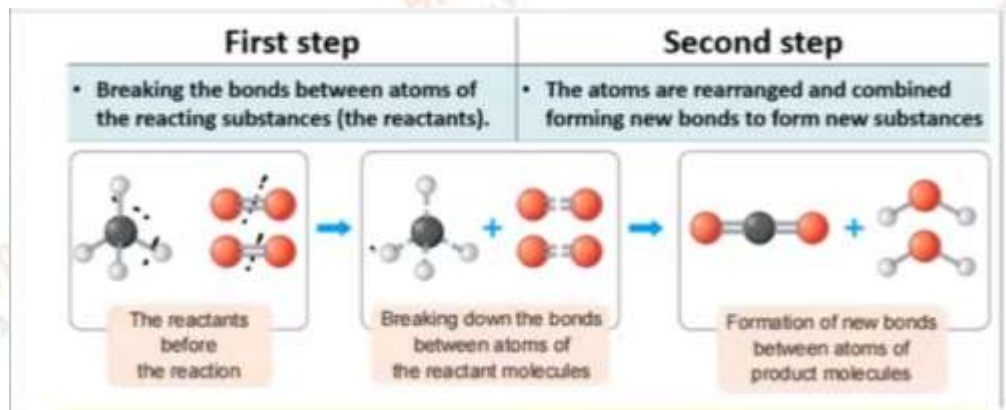
2-What are the factors that affect the temperature of a body (system)?

Mass of substance

Type of substance

State of substance

3-What are the steps of a chemical reaction?



4-What are the laboratory safety precautions when burning a magnesium ribbon?

Hold it with a tong

Wear a protective mask

Don't touch the powder immediately

5- Mention examples of some chemical reactions that occur in daily life.

Fireworks

Change apple slice into brown

Frying egg



كيفية طباعة صفحات معينة من ملف معين مثلا ازاي نطبع الصفحات من صفحة 4 الى صفحة 9

